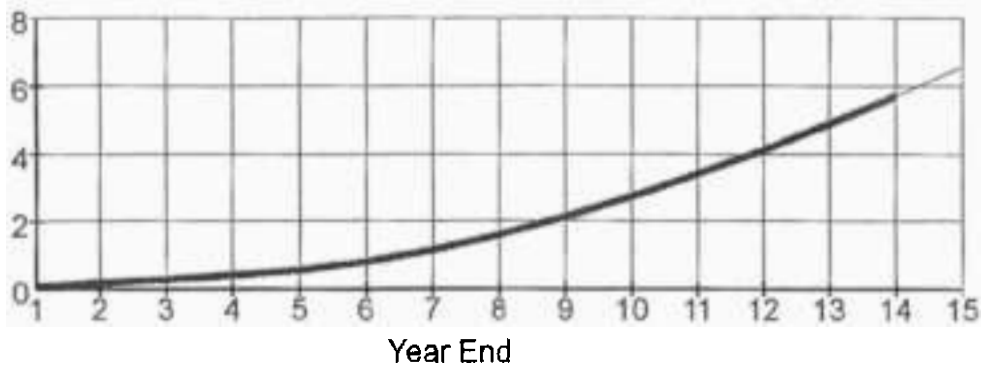


### No Bus Priority

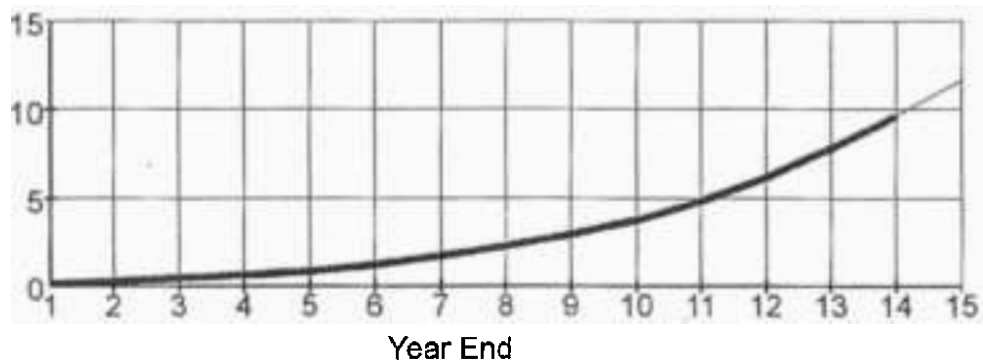
Low Growth

Scheme NPV (£ mil)



High Growth

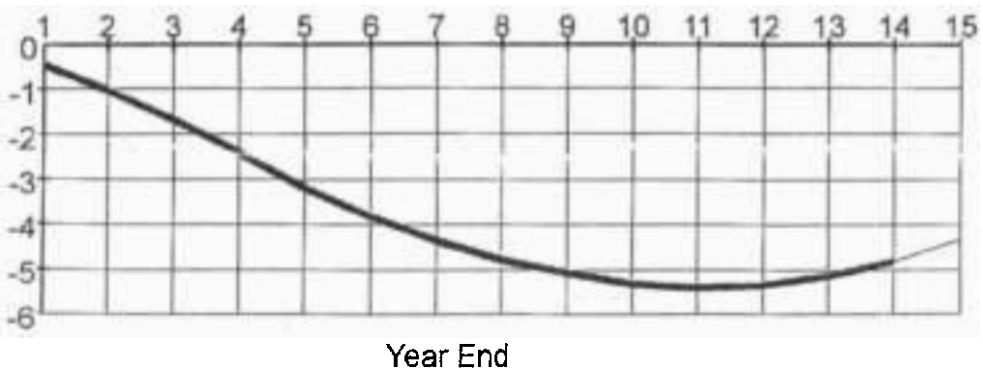
Scheme NPV (£ mil)



### With Bus Priority

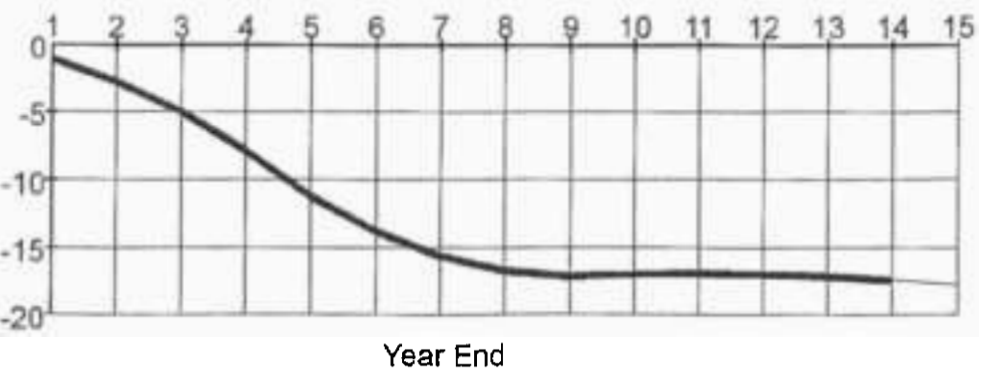
Low Growth

Scheme NPV (£ mil)



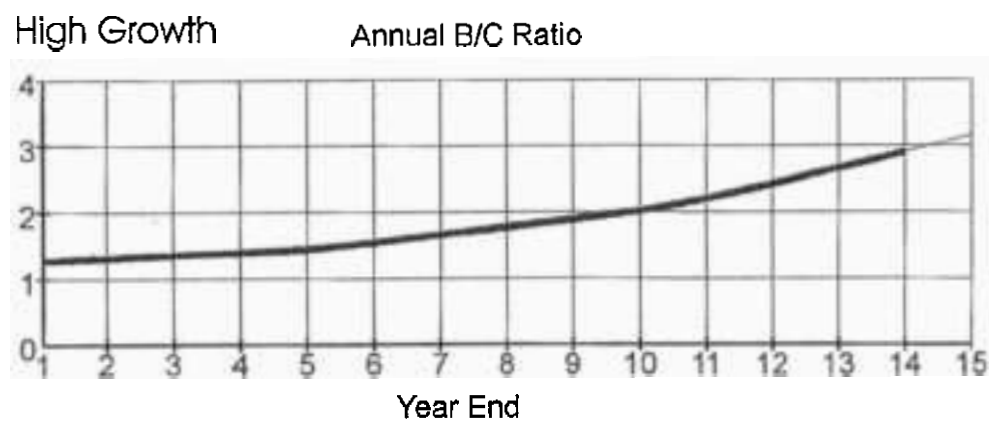
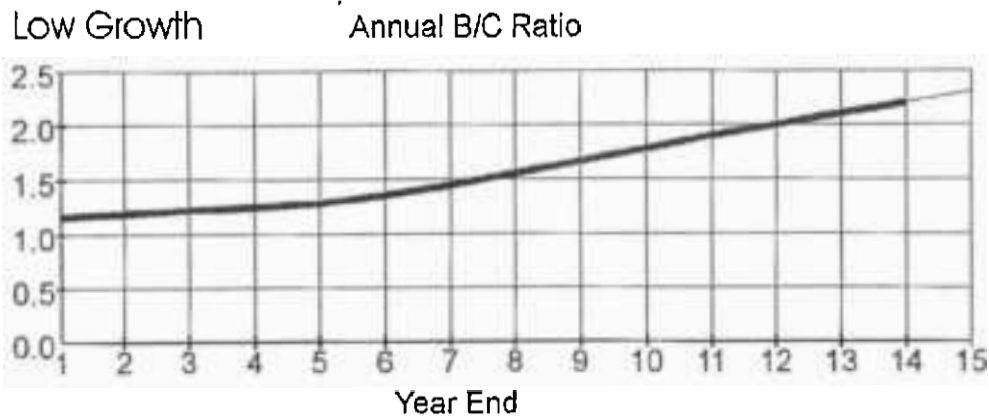
High Growth

Scheme NPV (£ mil)

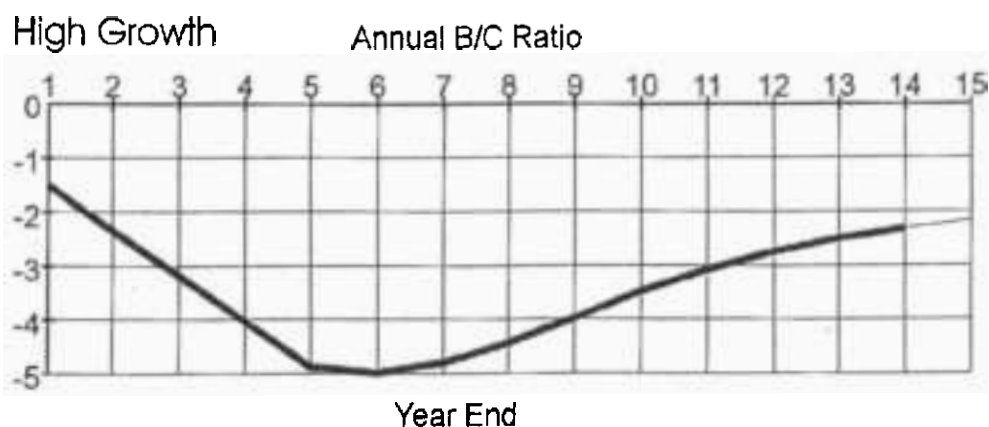
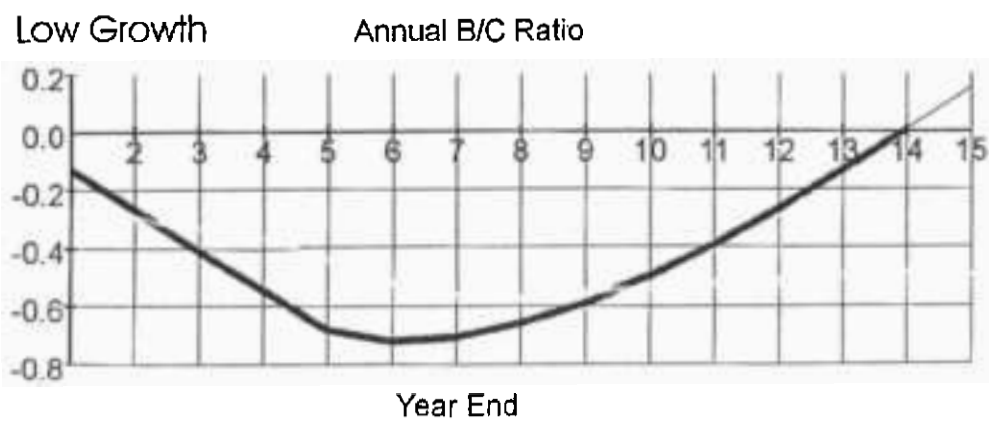


Annual B/C Ratio (Excluding Capital Costs)

No Bus Priority

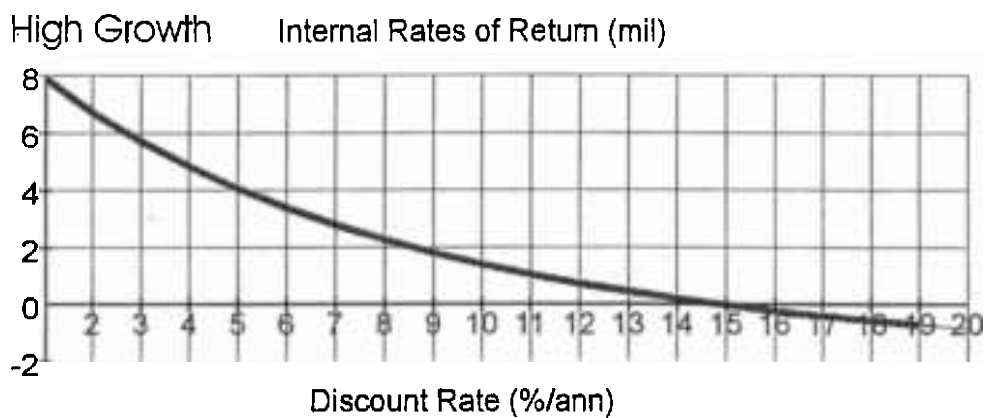
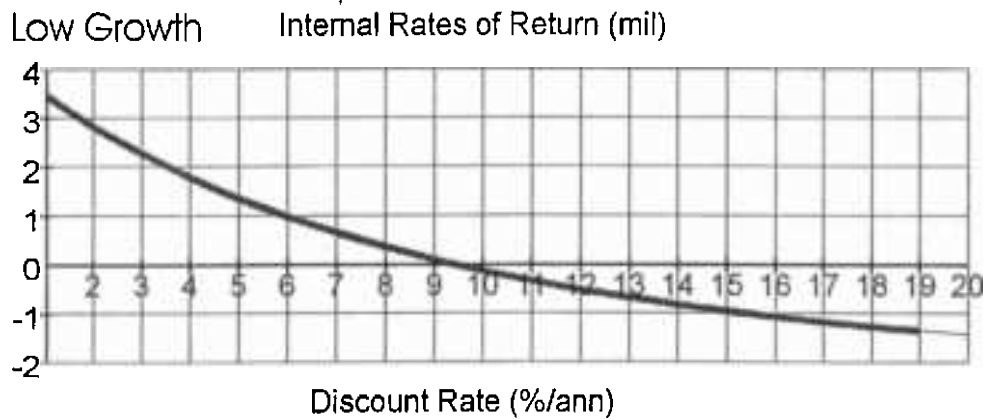


With Bus Priority

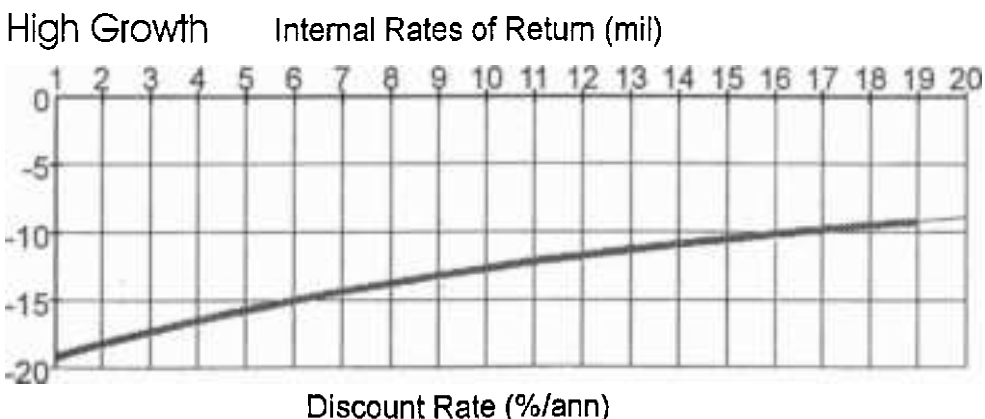
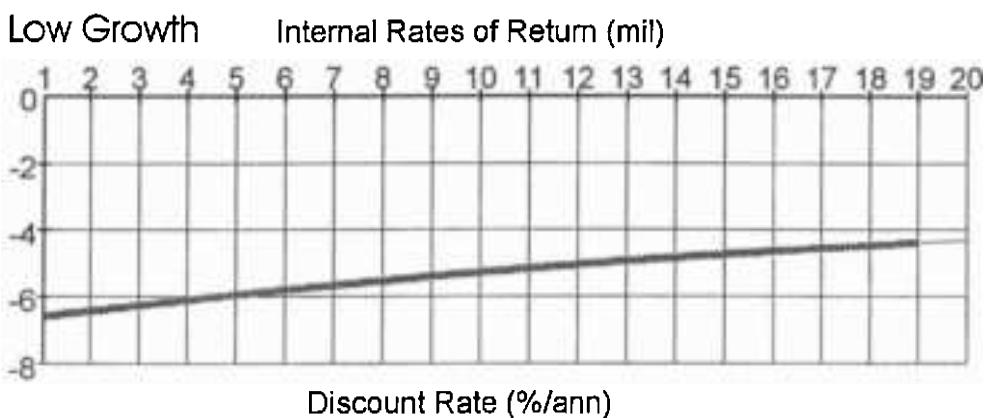


# Internal Rate of Return (Including Capital Costs)

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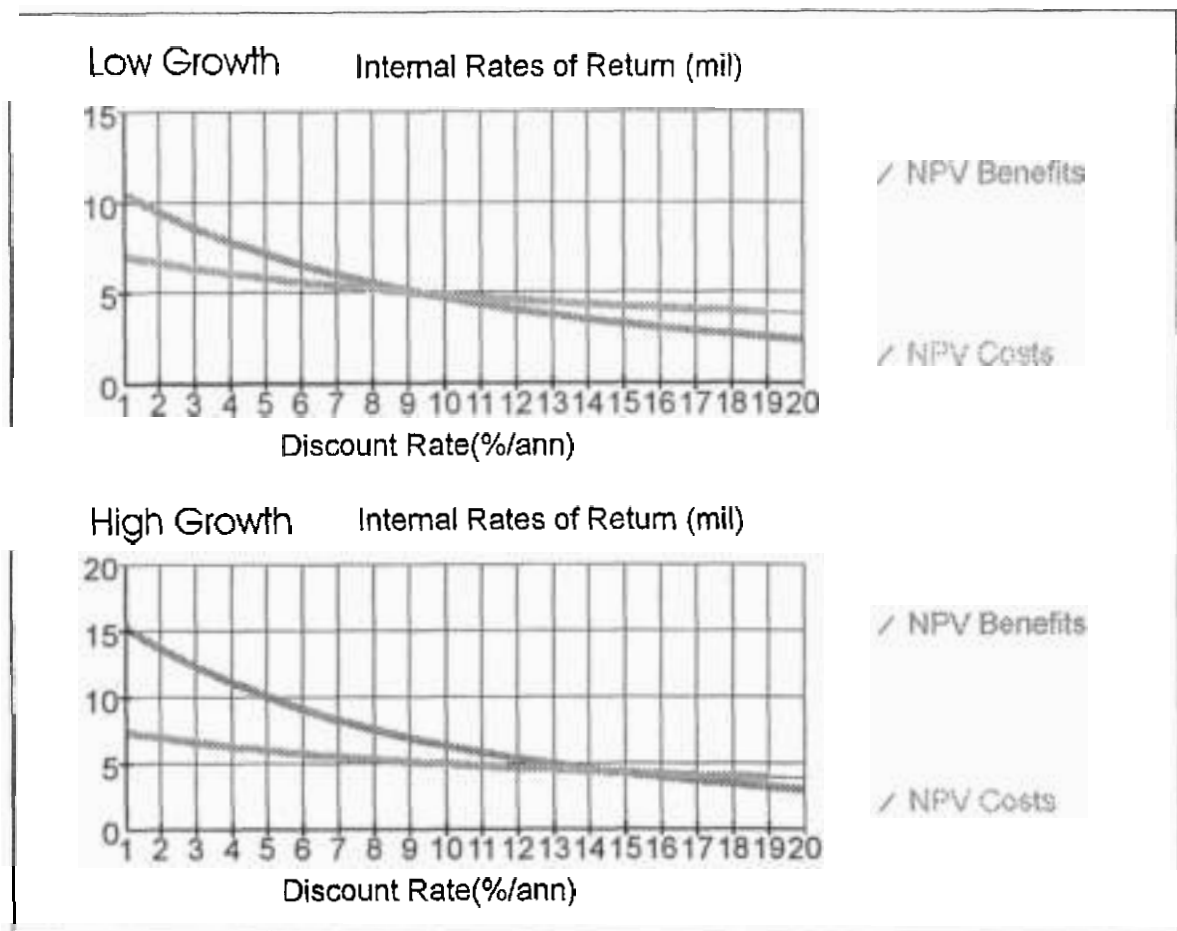


## With Bus Priority

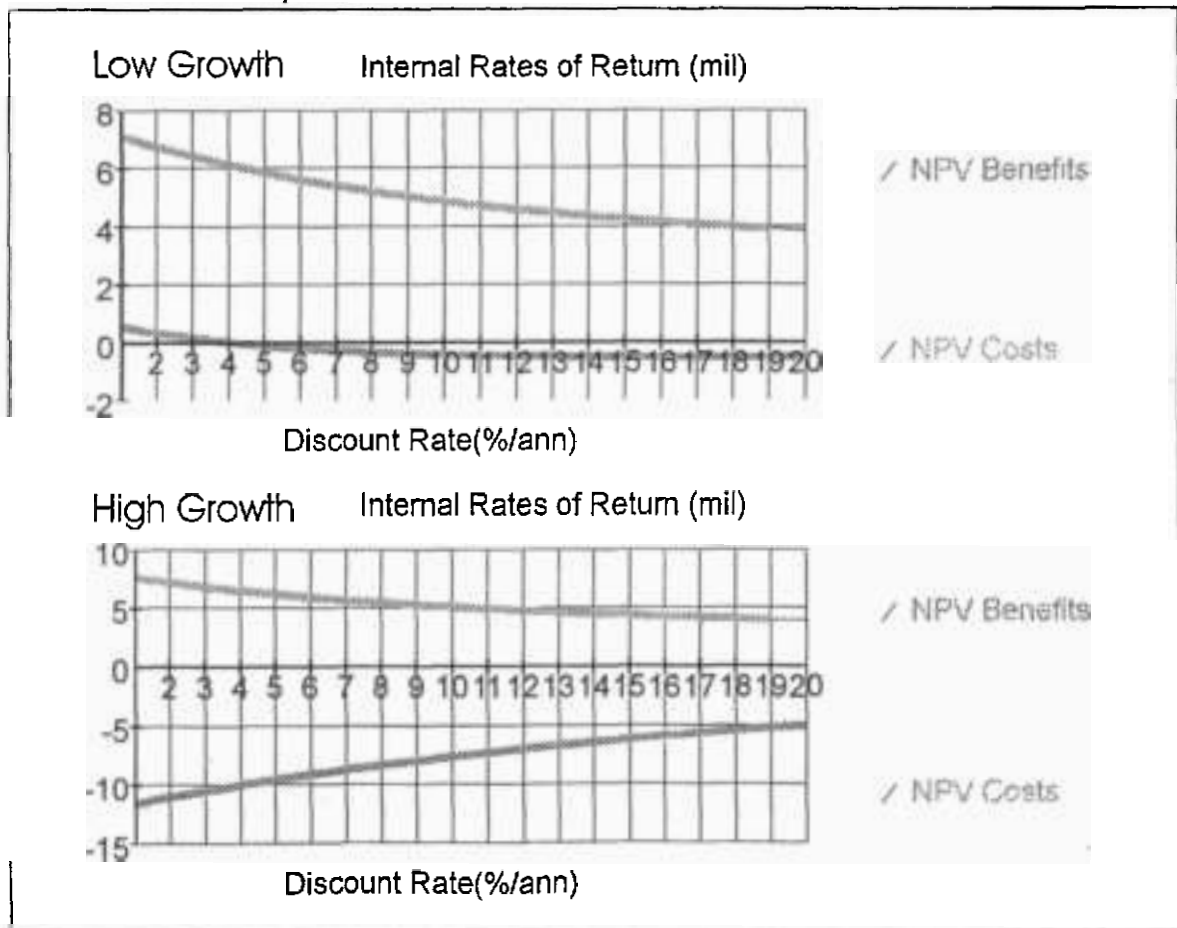


Site 3: A12N  
IRR Costs & Benefits (Including Capital Costs)

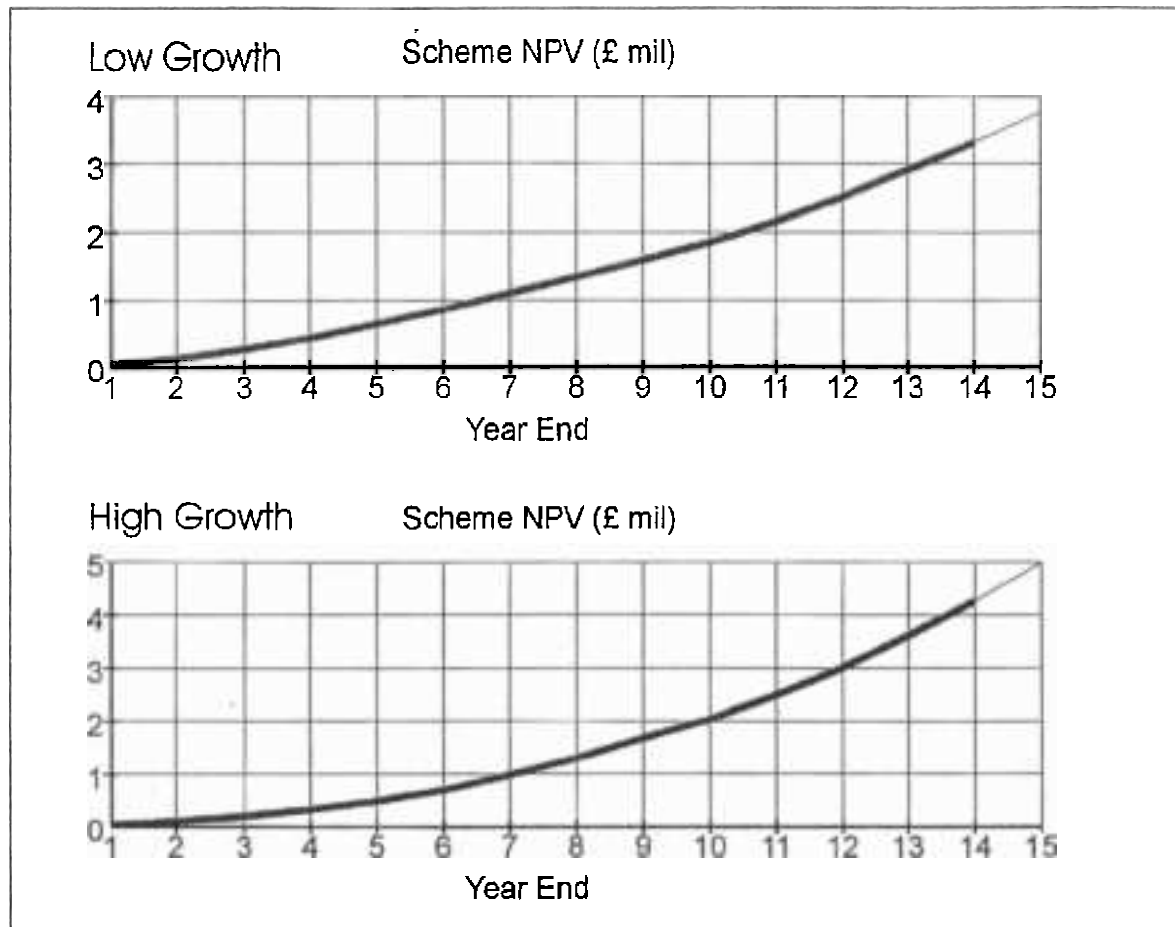
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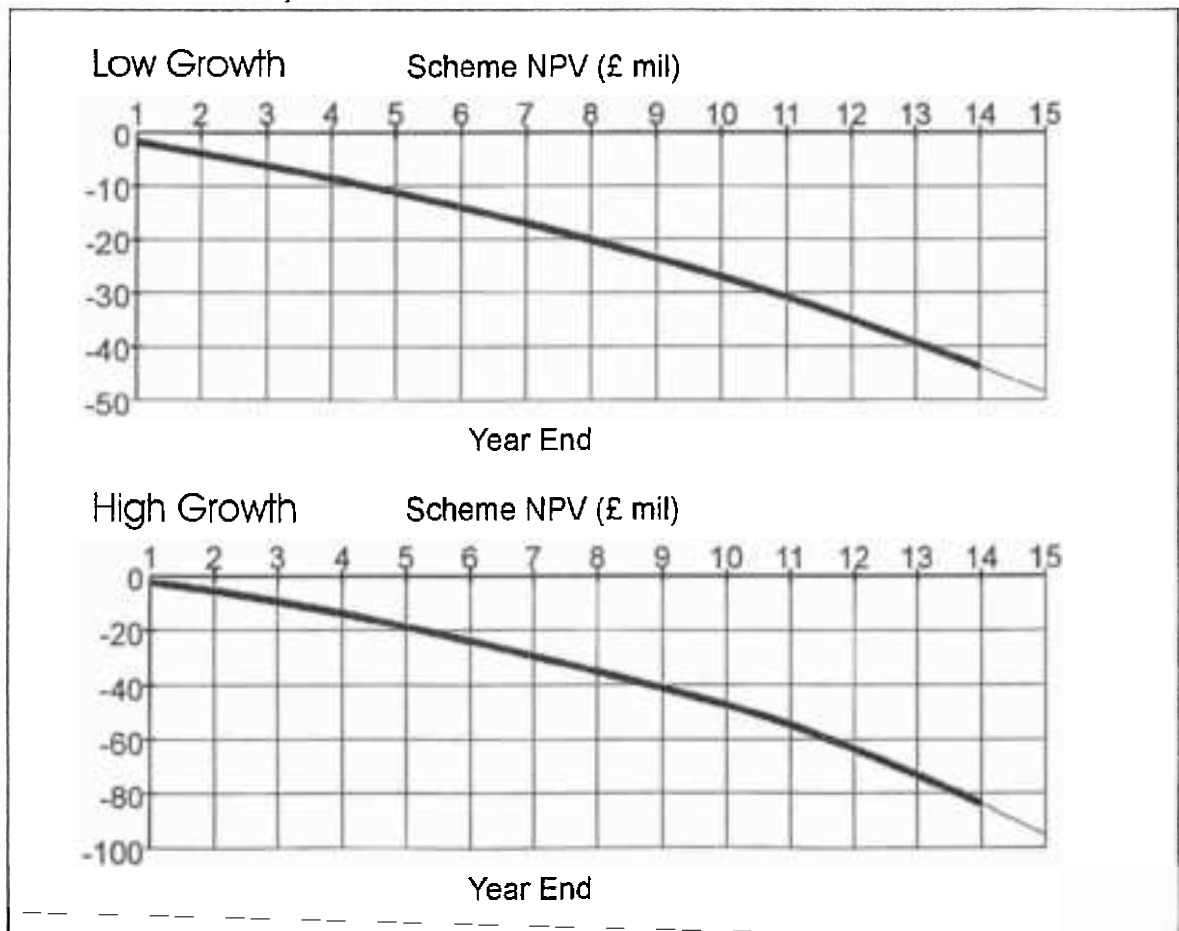
With Bus Priority



No Bus Priority

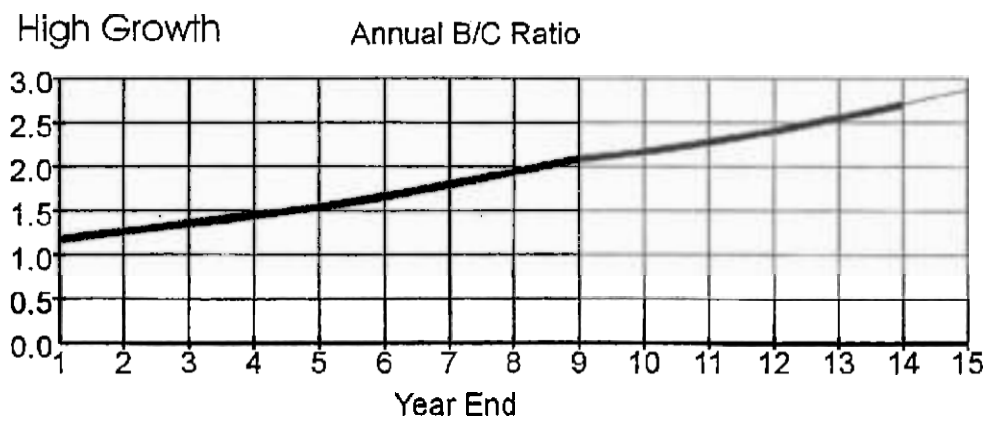
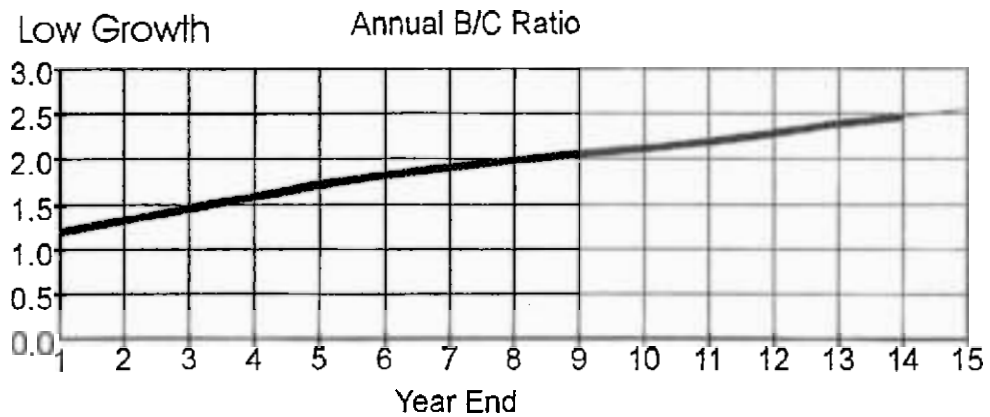


With Bus Priority

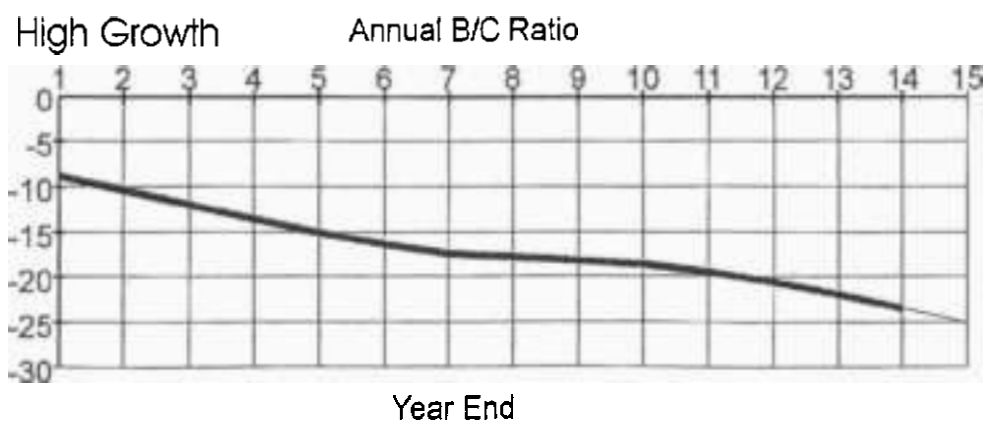
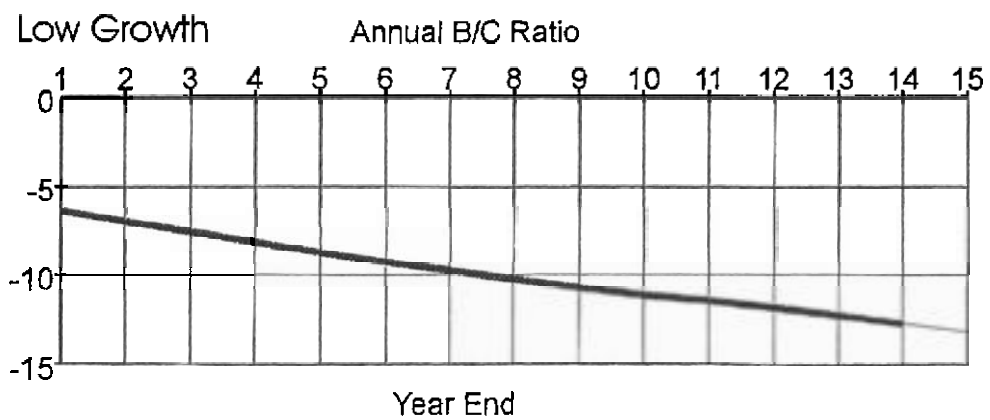


Site 4: A1060  
Annual B/C Ratio (Excluding Capital Costs)

No Bus Priority



With Bus Priority

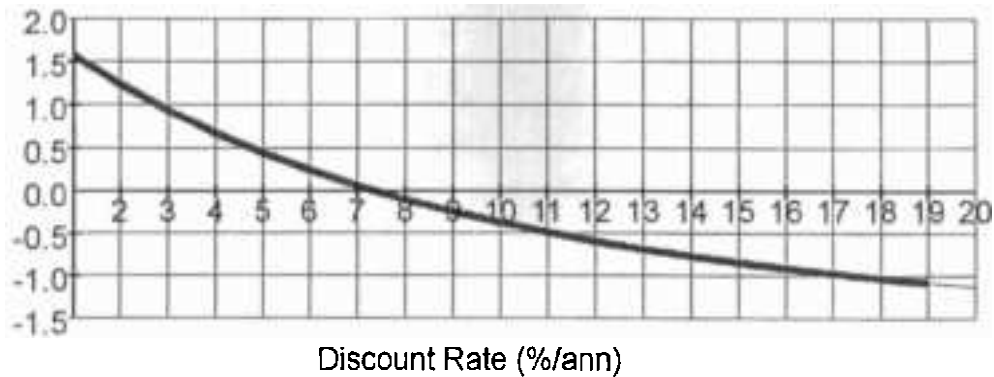


# Internal Rate of Return (Including Capital Costs)

## No Bus Priority

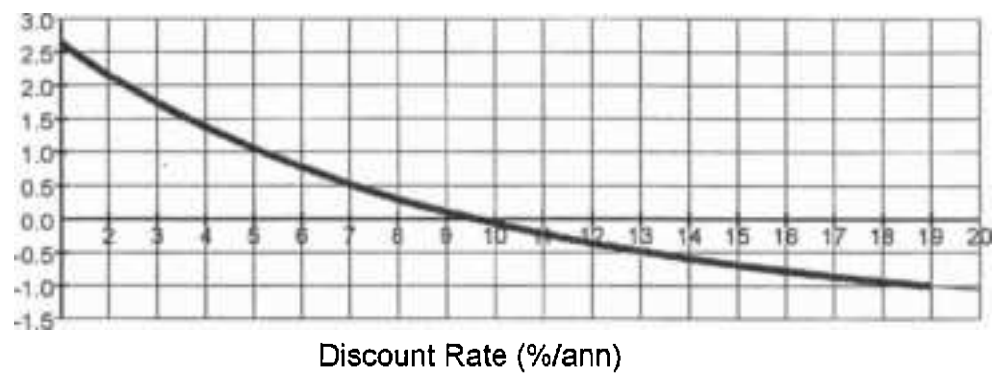
Low Growth

Internal Rates of Return (mil)



High Growth

Internal Rates of Return (mil)



## With Bus Priority

Low Growth

Internal Rates of Return (mil)



High Growth

Internal Rates of Return (mil)

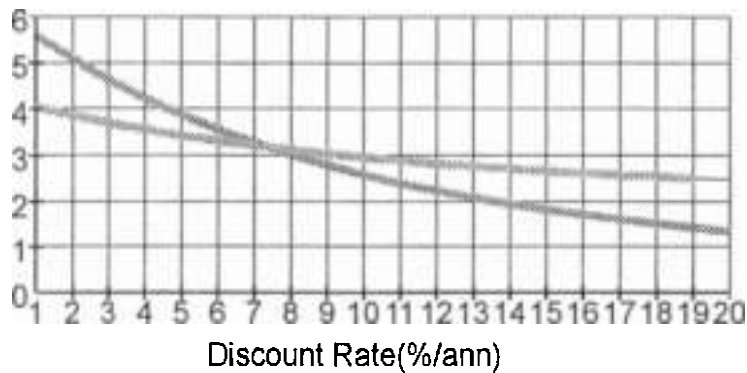


# IRR Costs & Benefits (Including Capital Costs)

## No Bus Priority

Low Growth

Internal Rates of Return (mil)

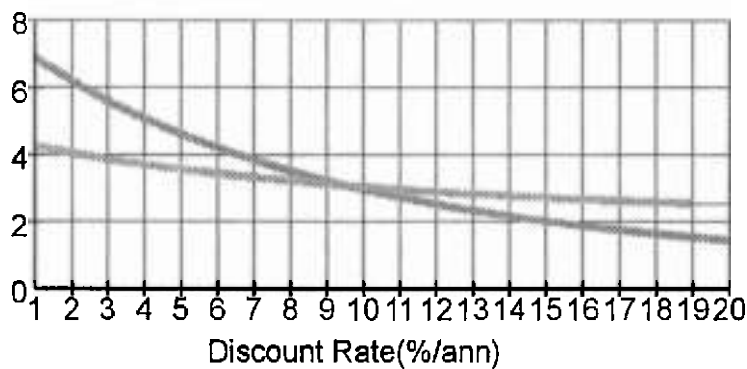


/ NPV Benefits

/ NPV Costs

High Growth

Internal Rates of Return (mil)



/ NPV Benefits

/ NPV Costs

## With Bus Priority

Low Growth

Internal Rates of Return (mil)



/ NPV Benefits

/ NPV Costs

High Growth

Internal Rates of Return (mil)

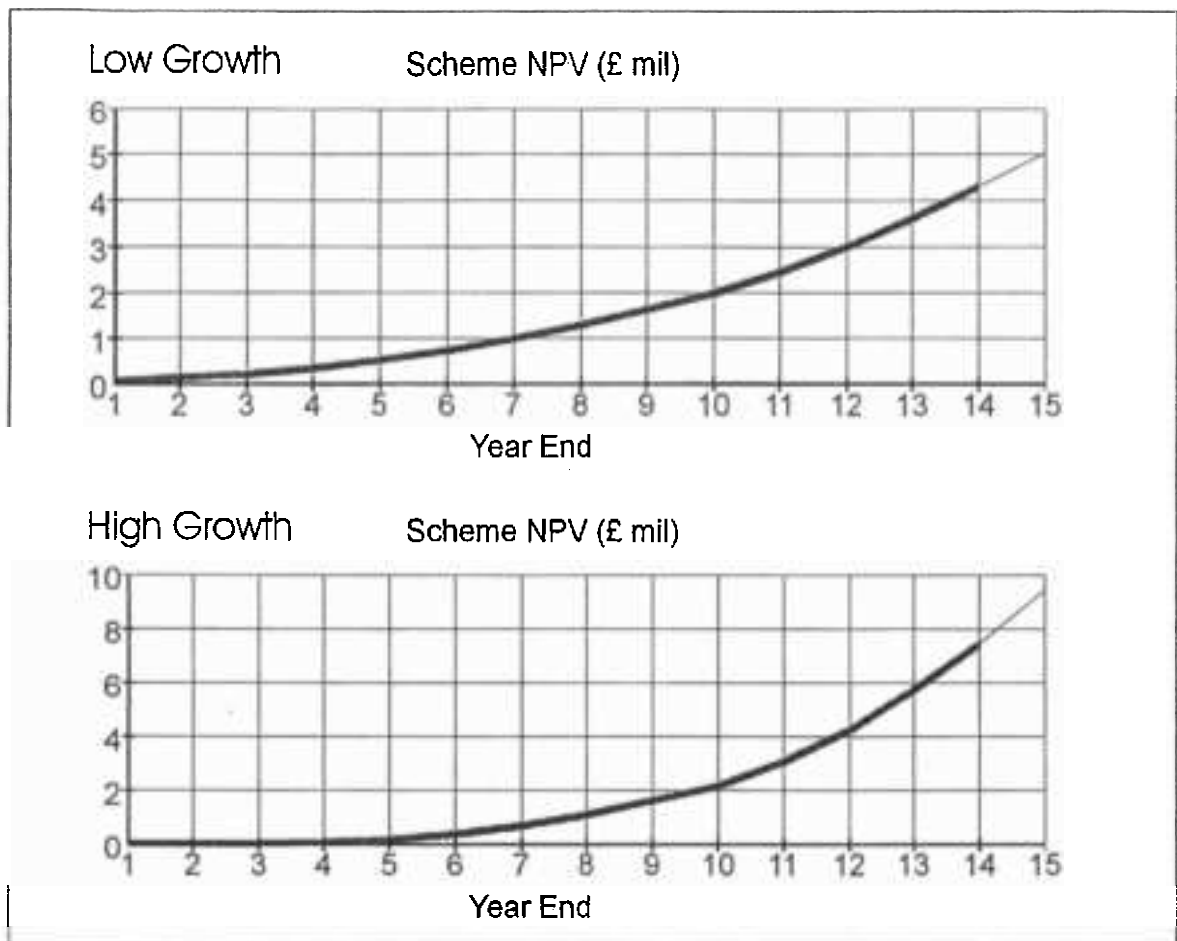


/ NPV Benefits

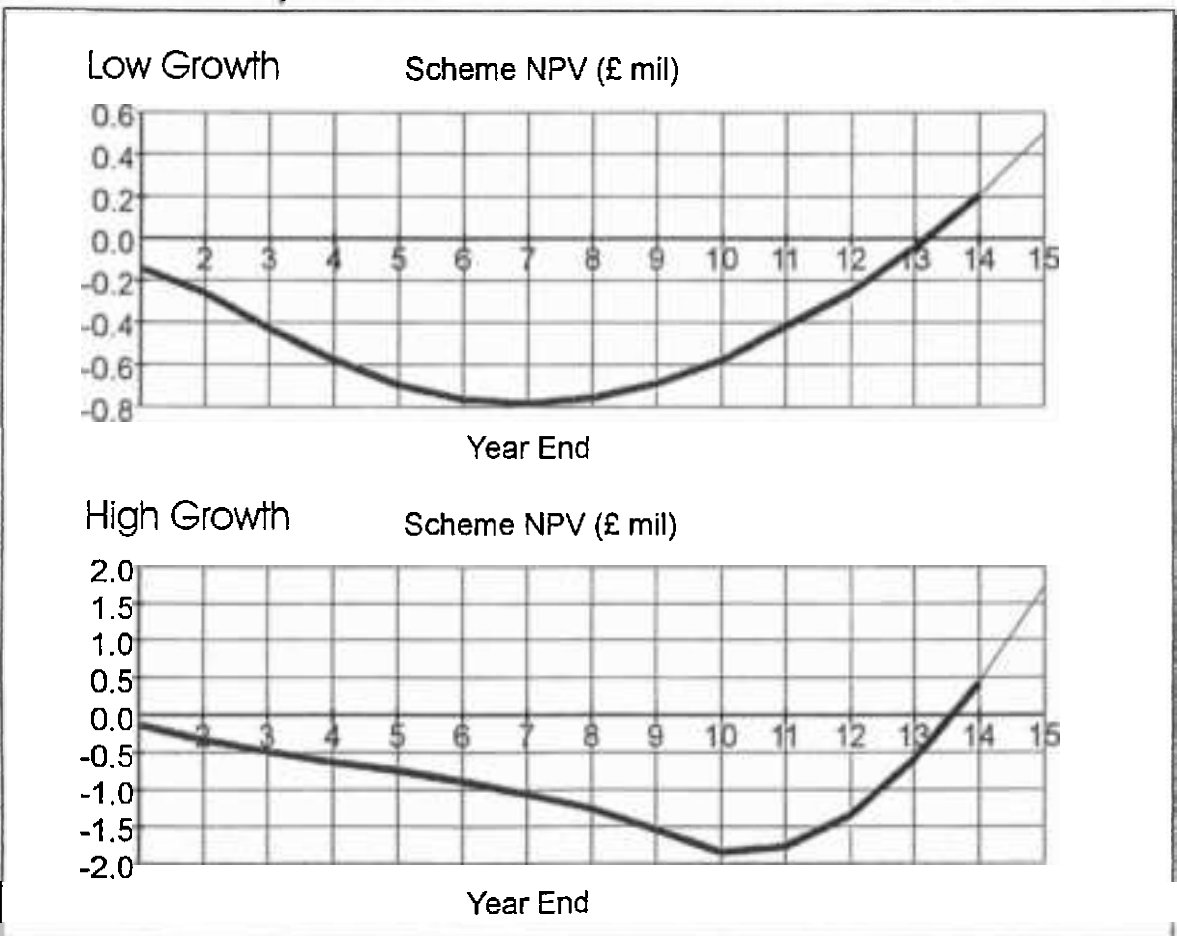
/ NPV Costs



### No Bus Priority

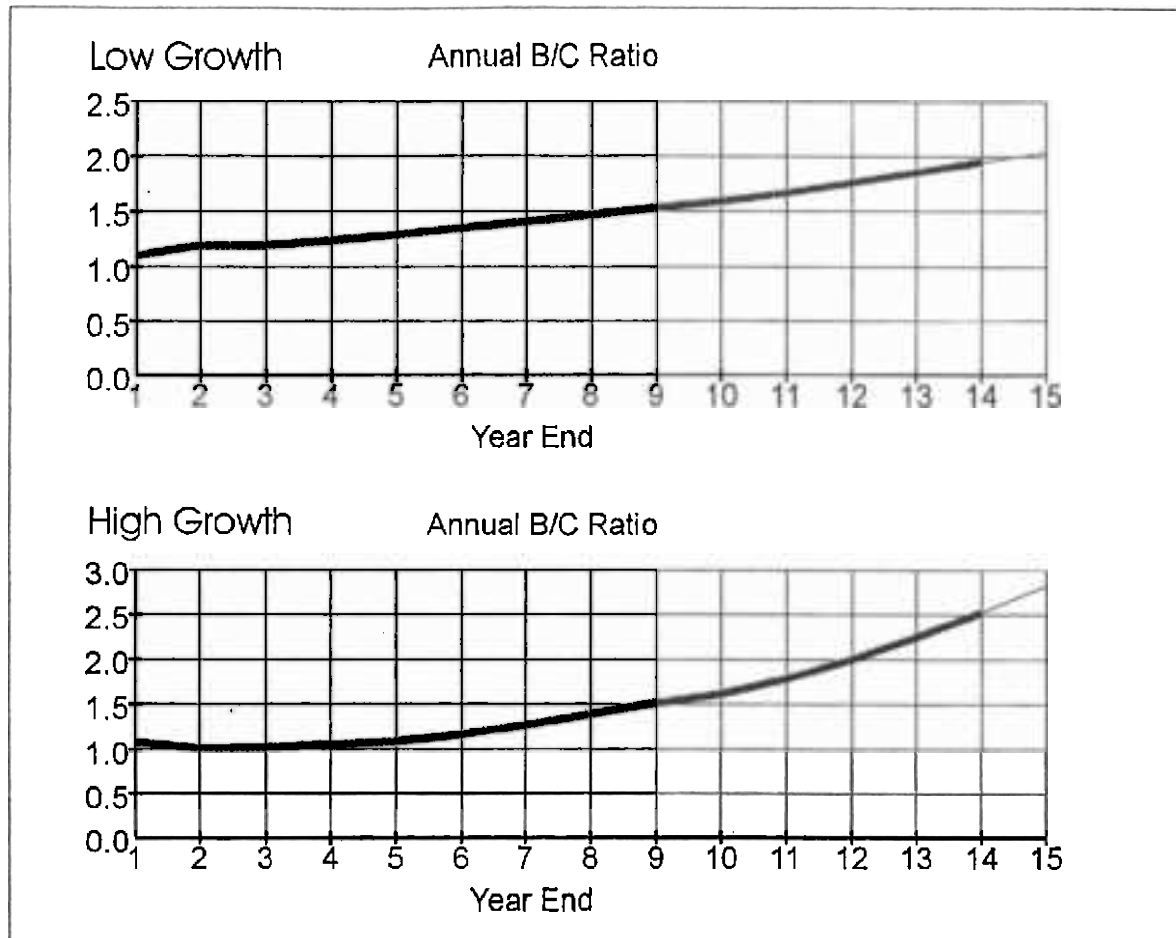


### With Bus Priority

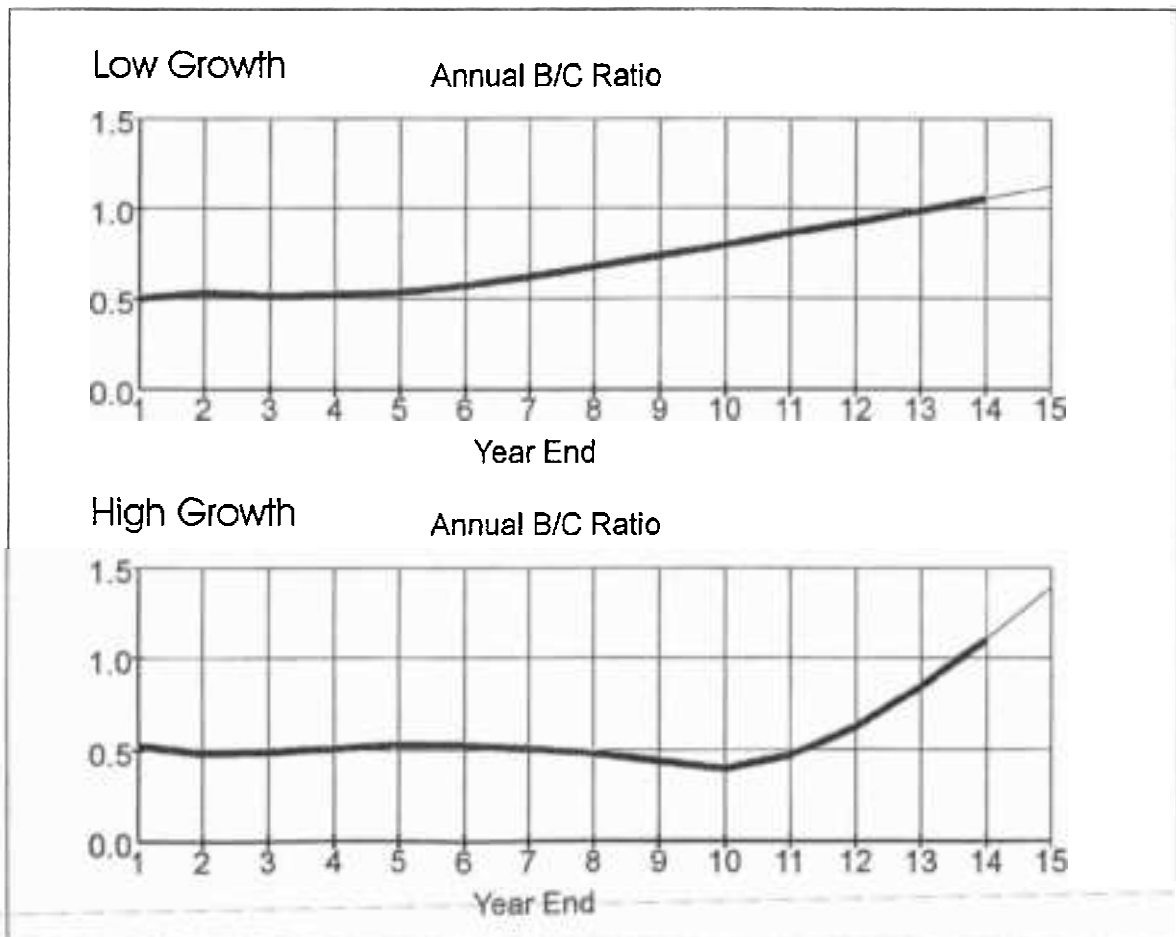


Site 5: A414E  
Annual B/C Ratio (Excluding Capital Cost)

No Bus Priority

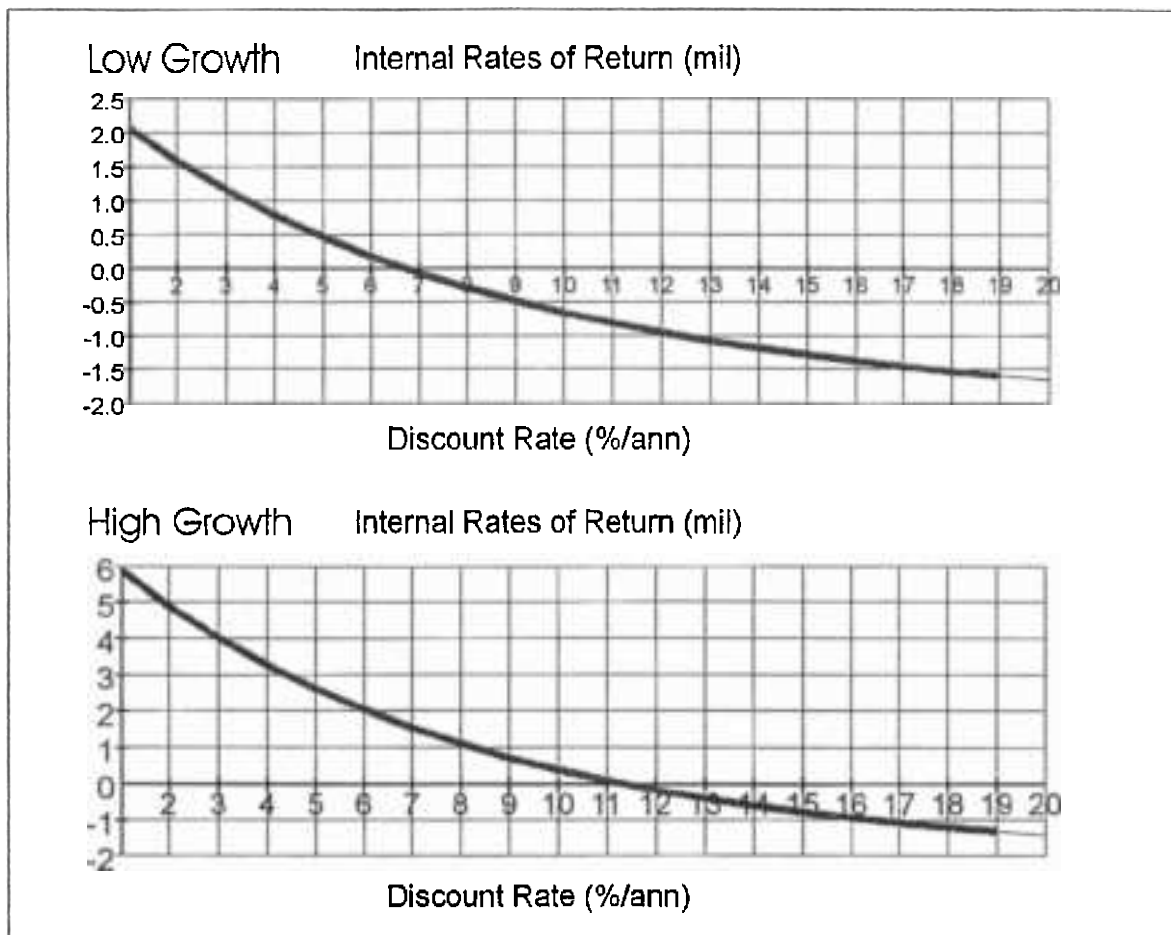


With Bus Priority

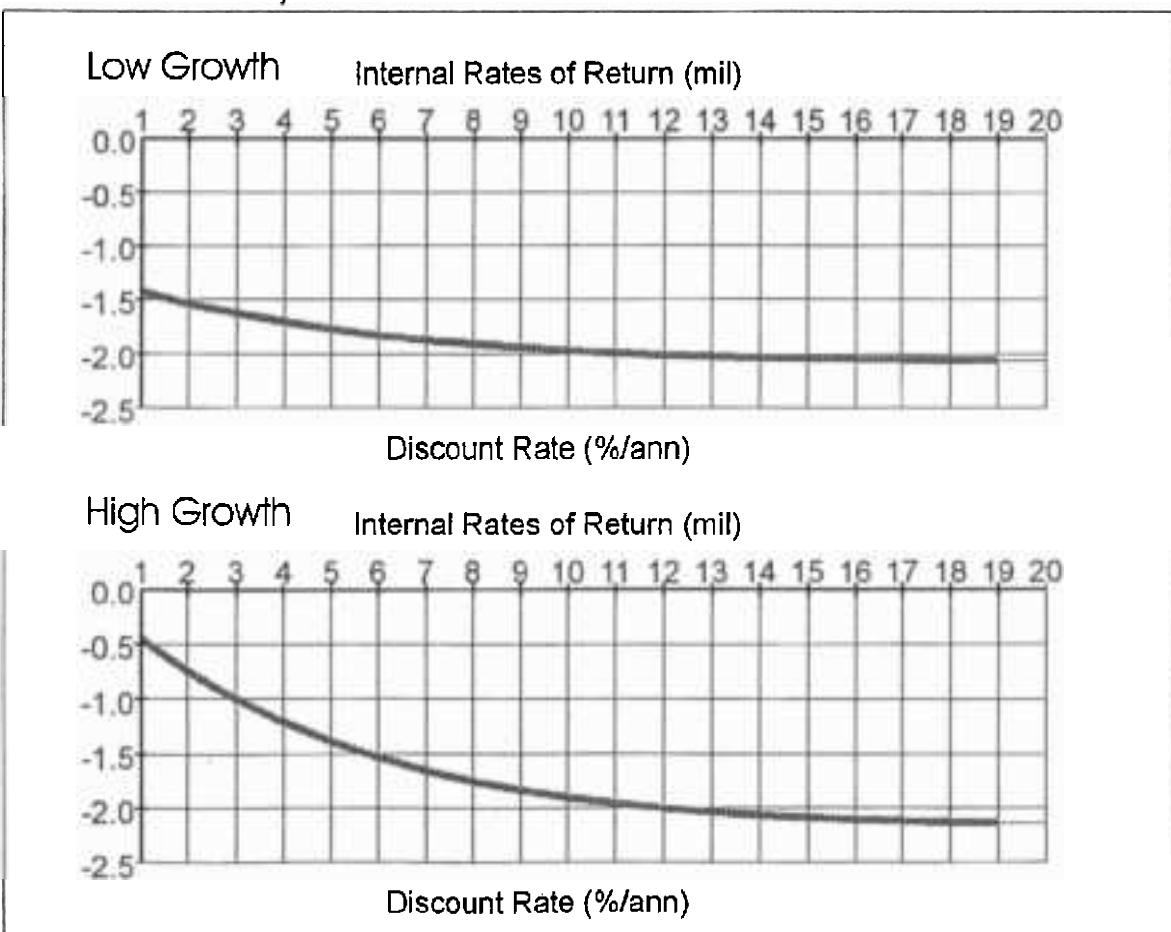


# Internal Rate of Return (Including Capital Costs)

No Bus Priority

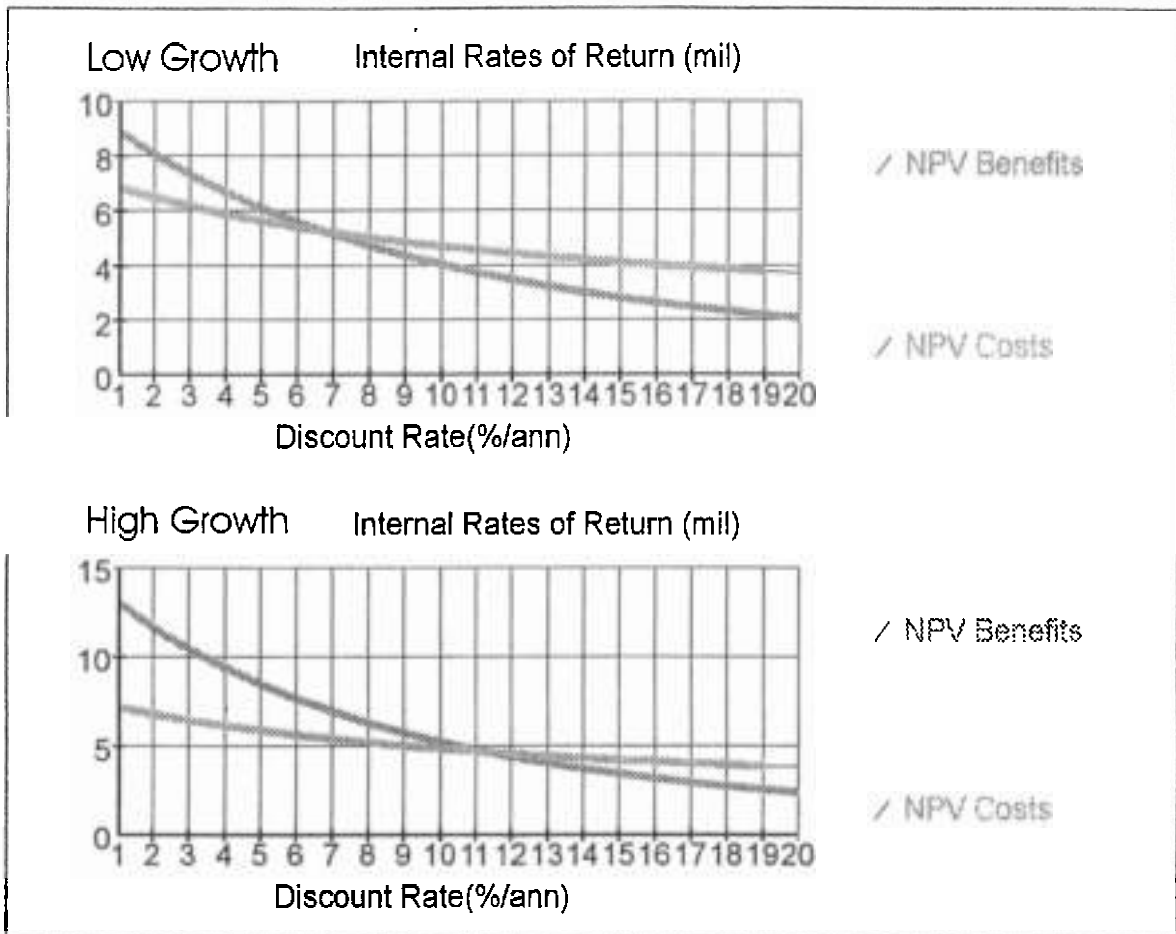


With Bus Priority

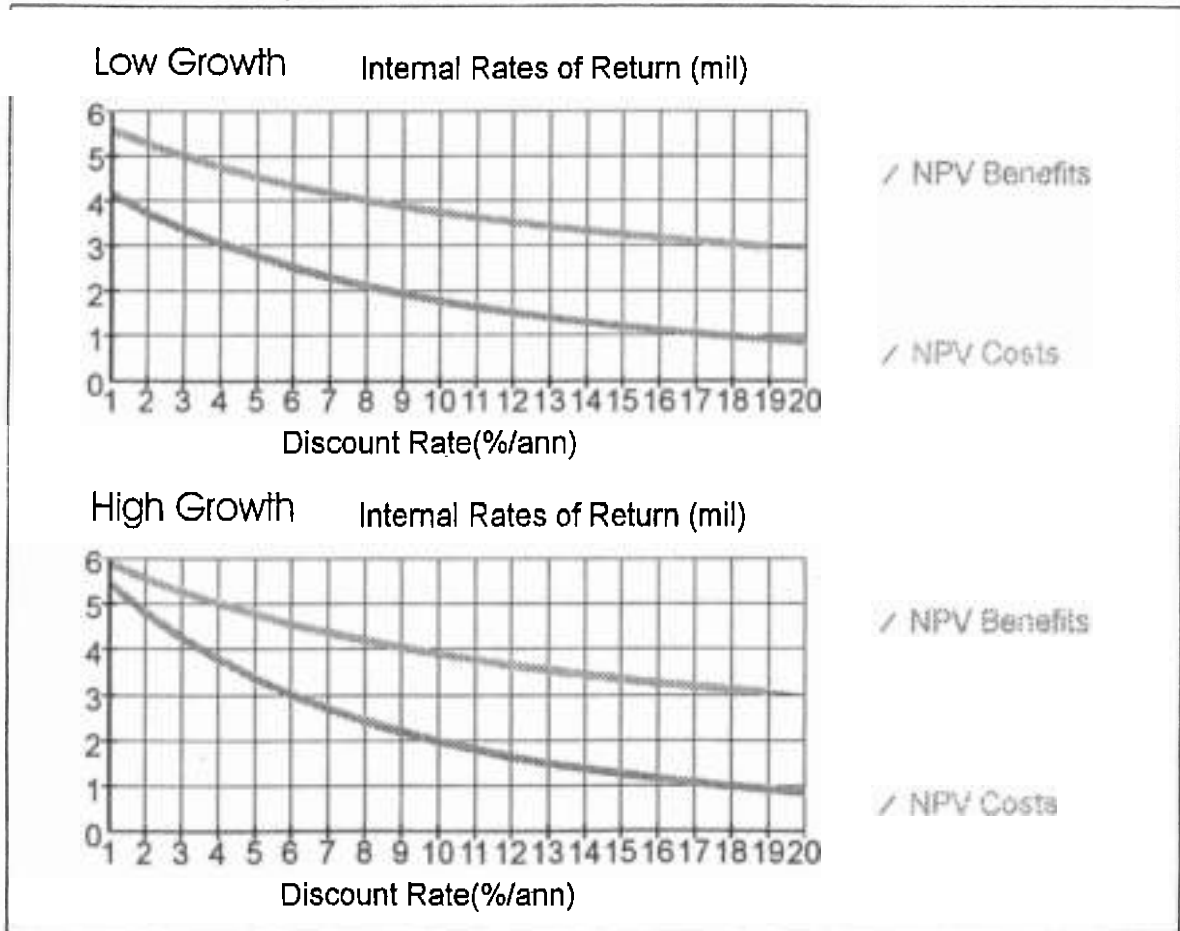


# IRR Costs & Benefits (Including Capital Costs)

## No Bus Priority

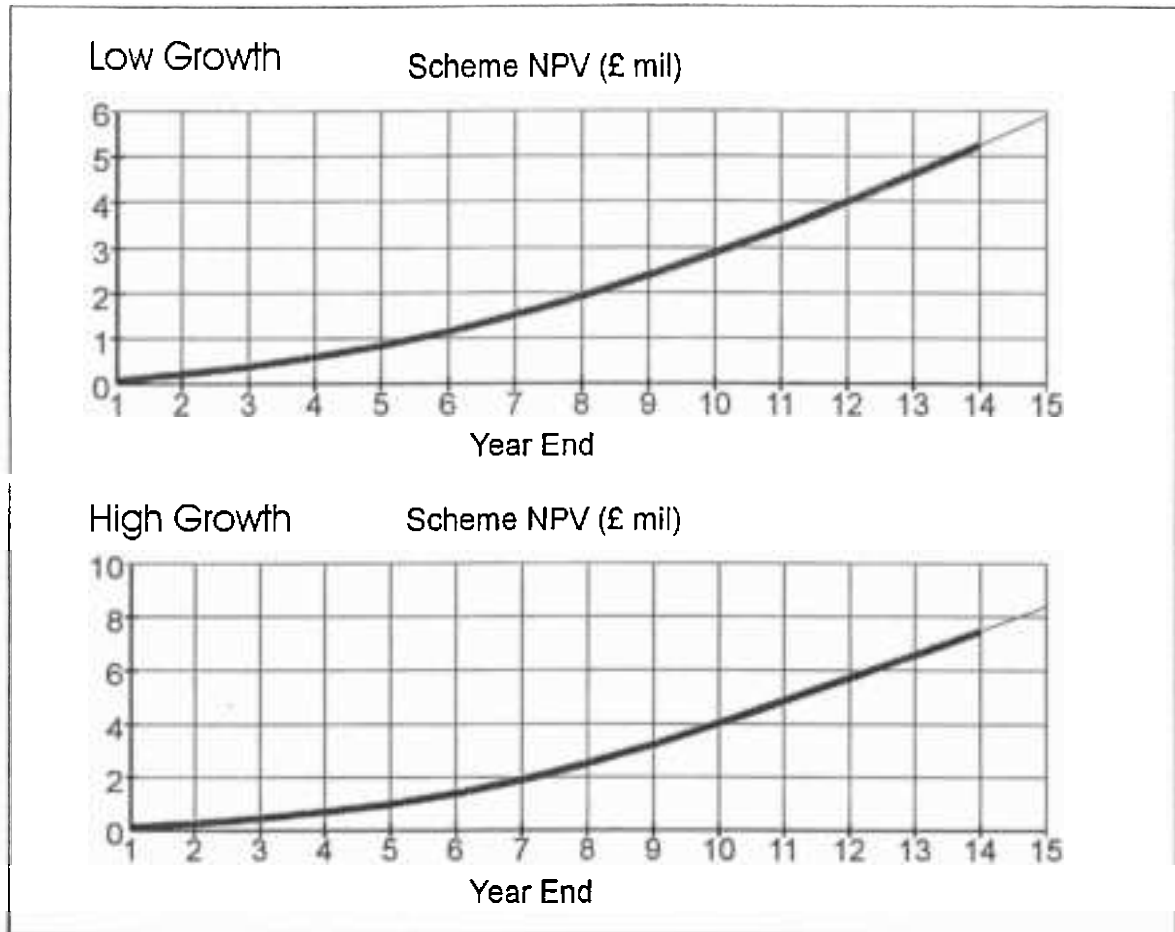


## With Bus Priority

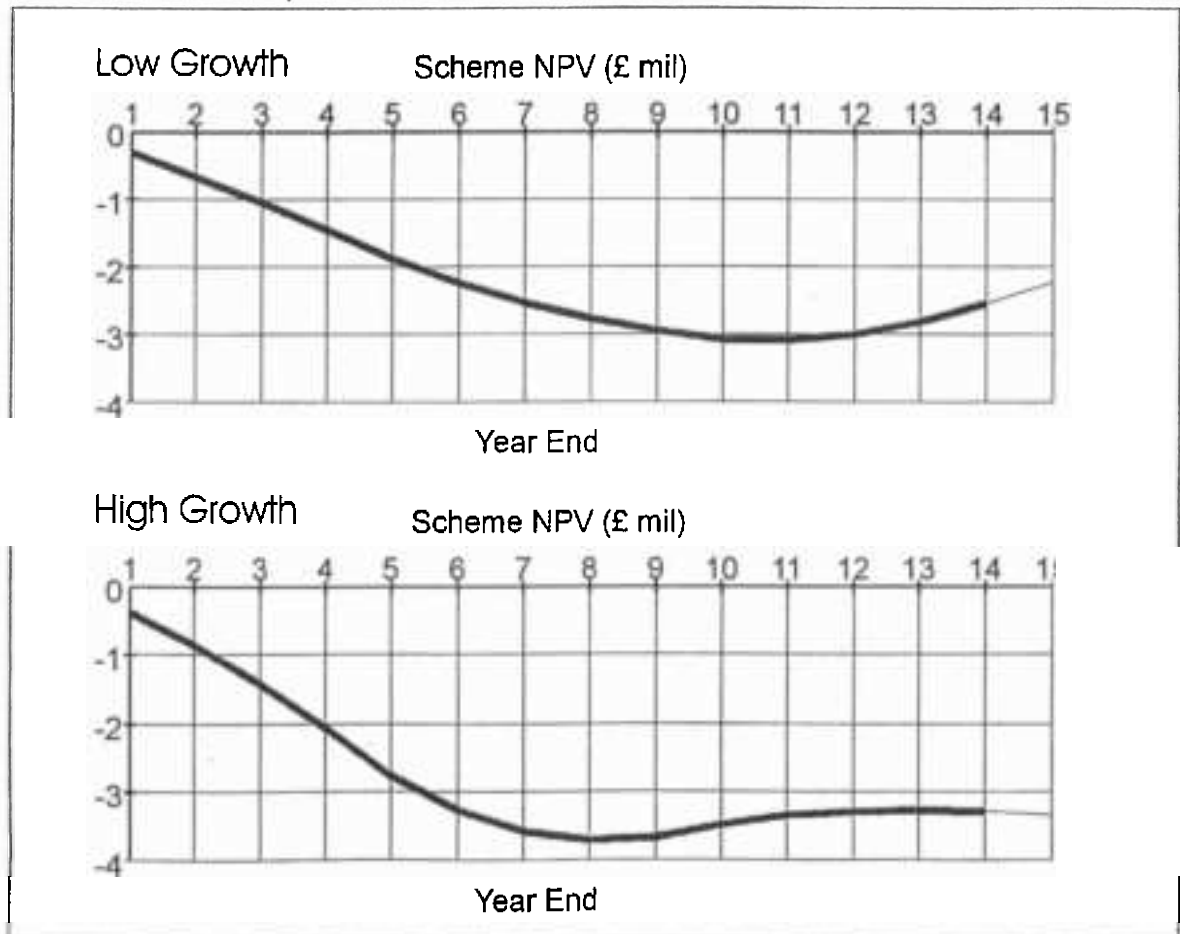


Site 6: A12S/A414W  
NPV (Excluding Capital Costs)

No Bus Priority

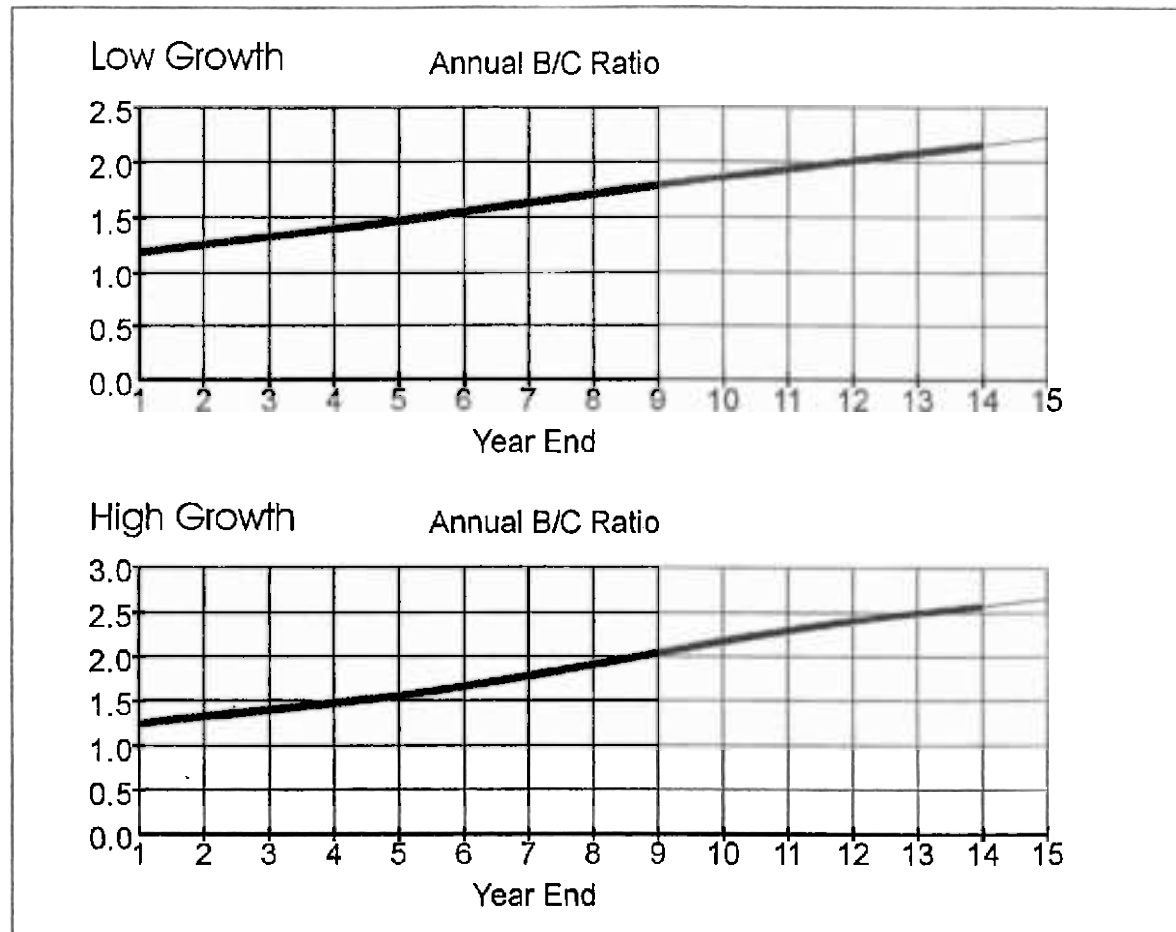


With Bus Priority

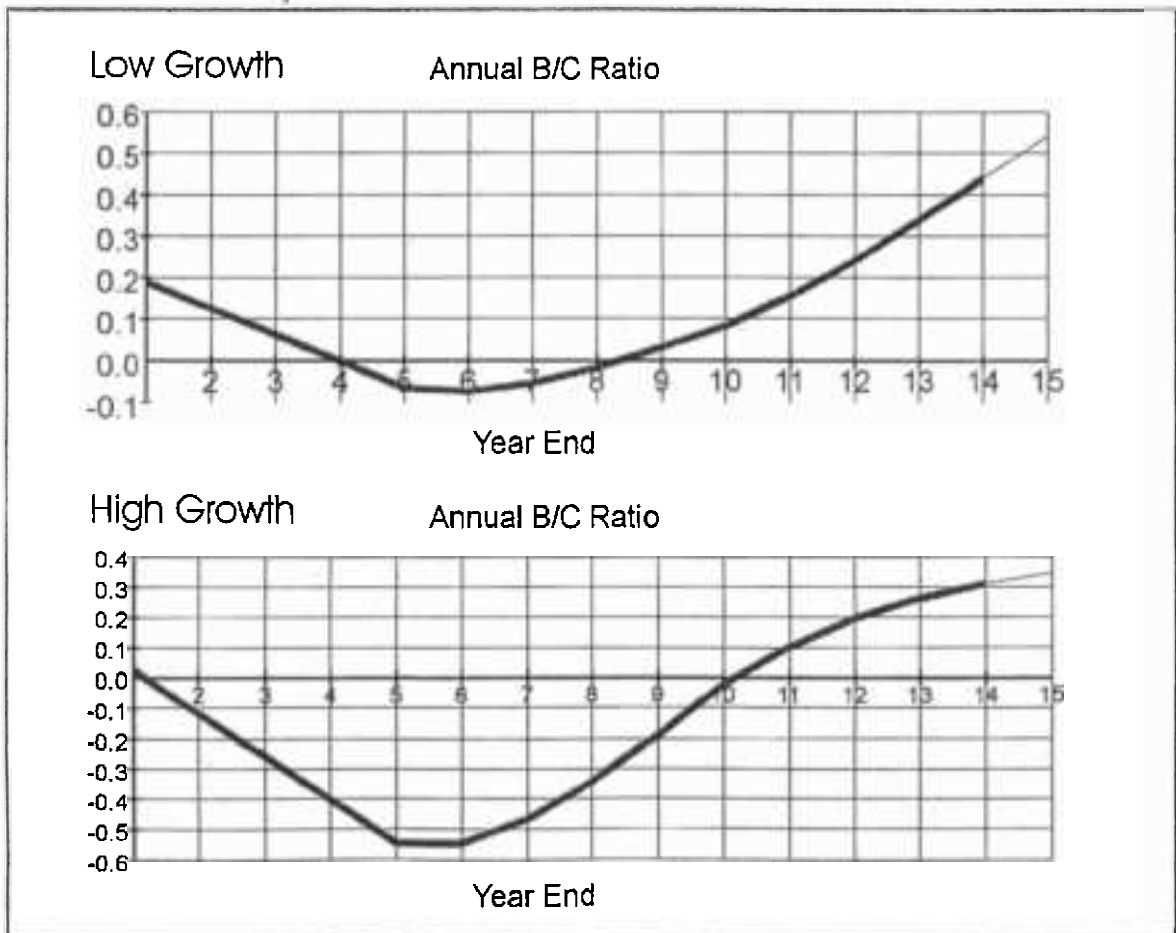


Site 6: A12S/A414W  
Annual B/C Ratio (Excluding Capital Costs)

No Bus Priority



With Bus Priority

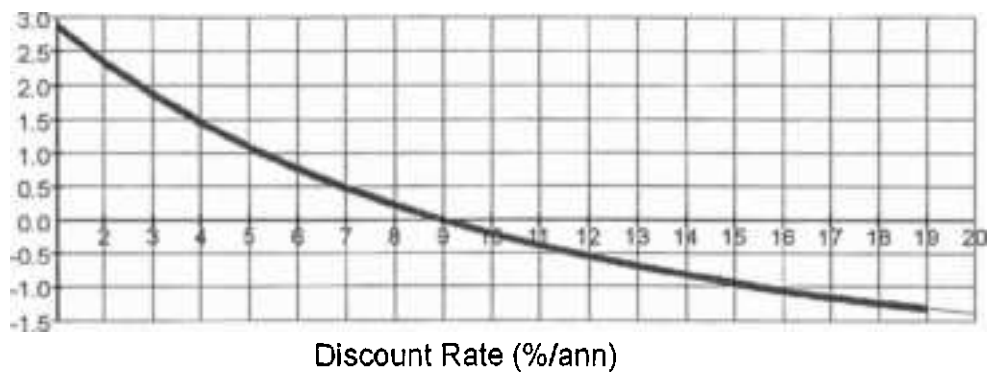


# Internal Rate of Return (Including Capital Costs)

## No Bus Priority

Low Growth

Internal Rates of Return (mil)



High Growth

Internal Rates of Return (mil)



## With Bus Priority

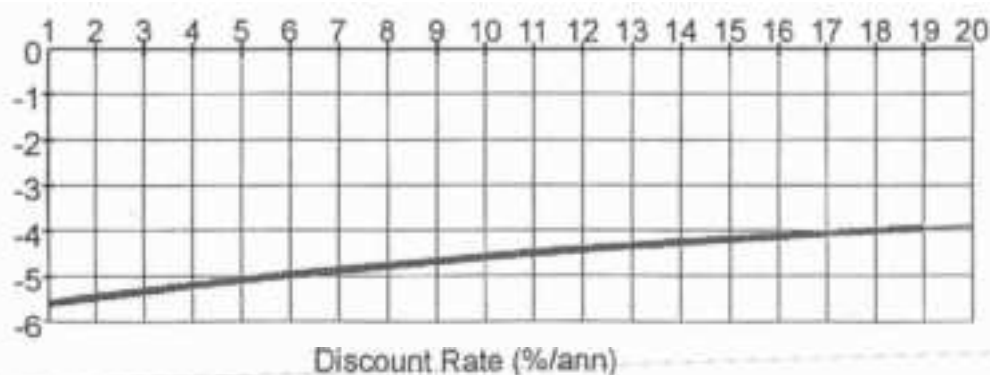
Low Growth

Internal Rates of Return (mil)



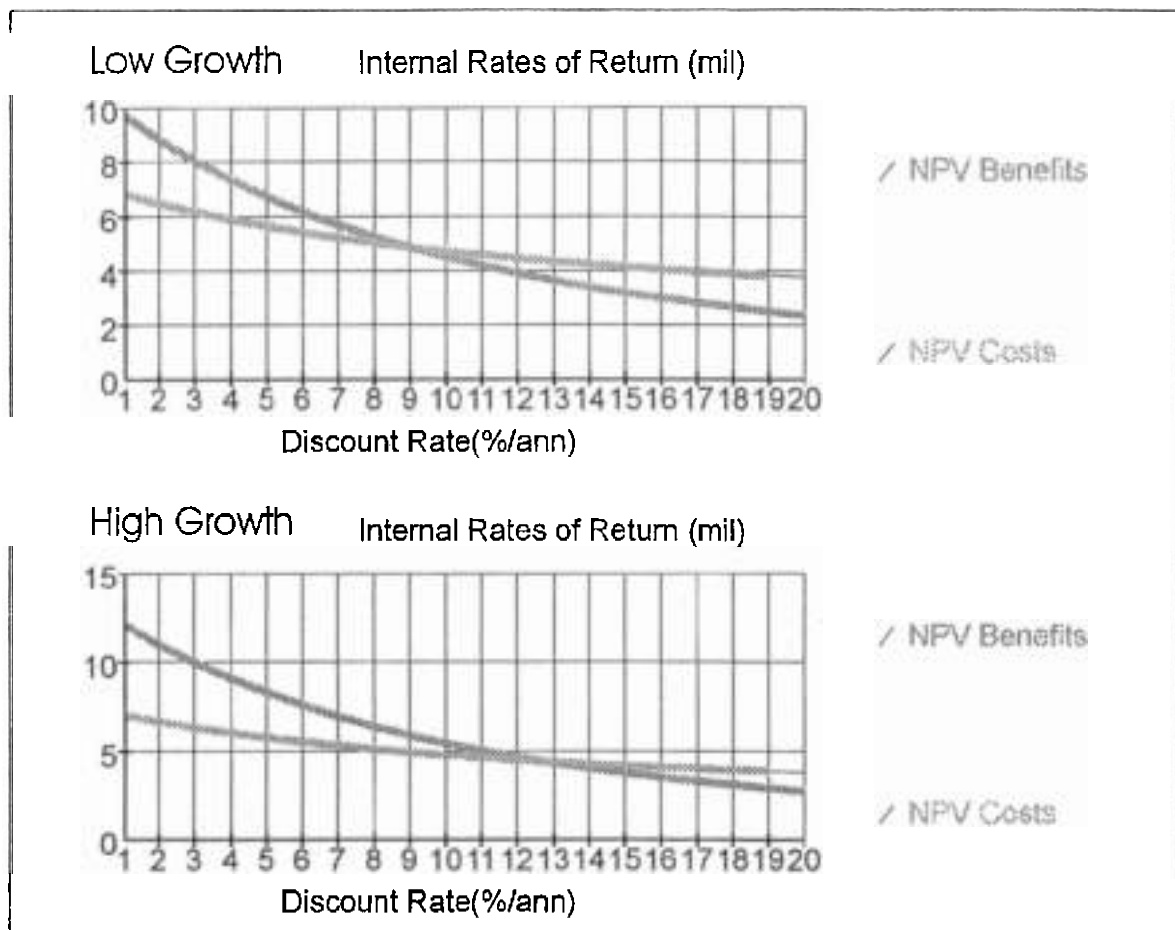
High Growth

Internal Rates of Return (mil)

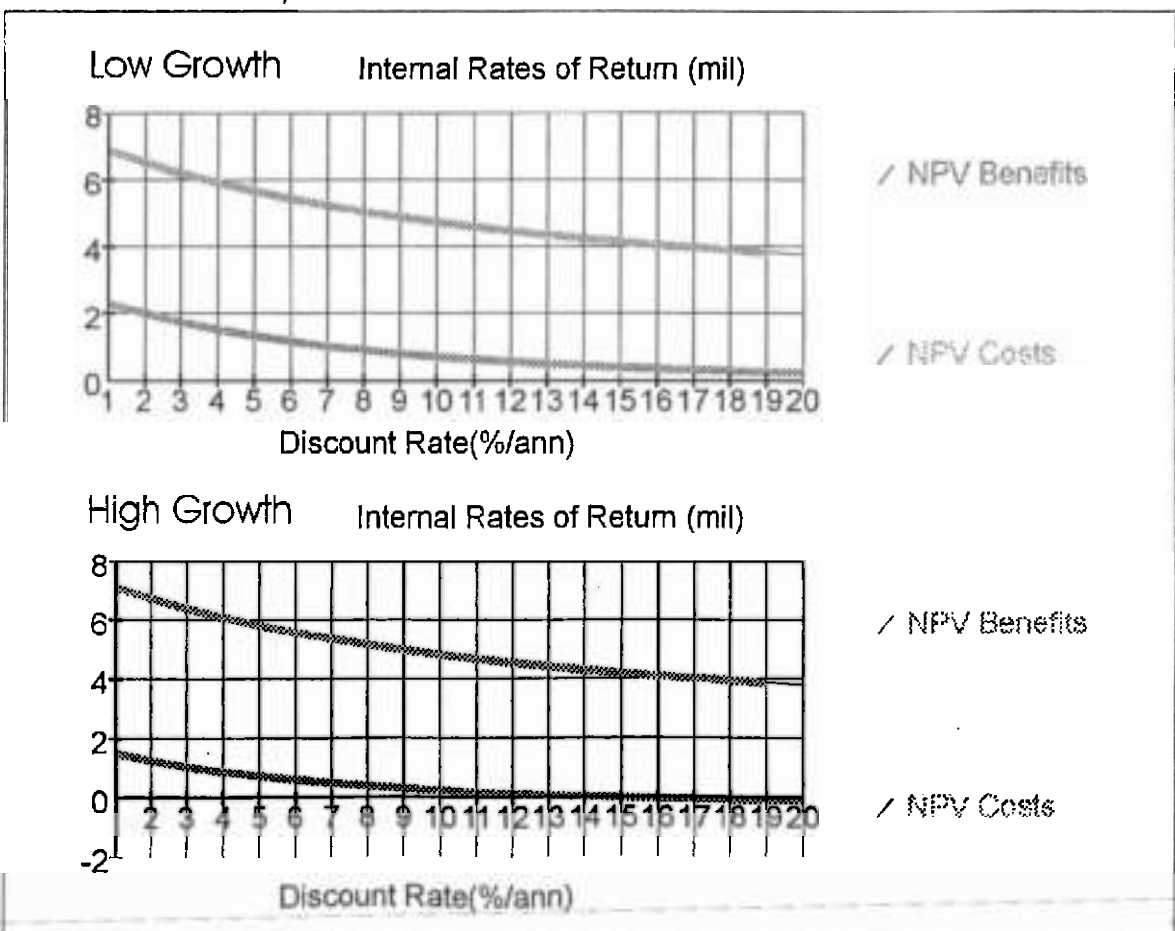


# IRR Costs & Benefits (Including Capital Costs)

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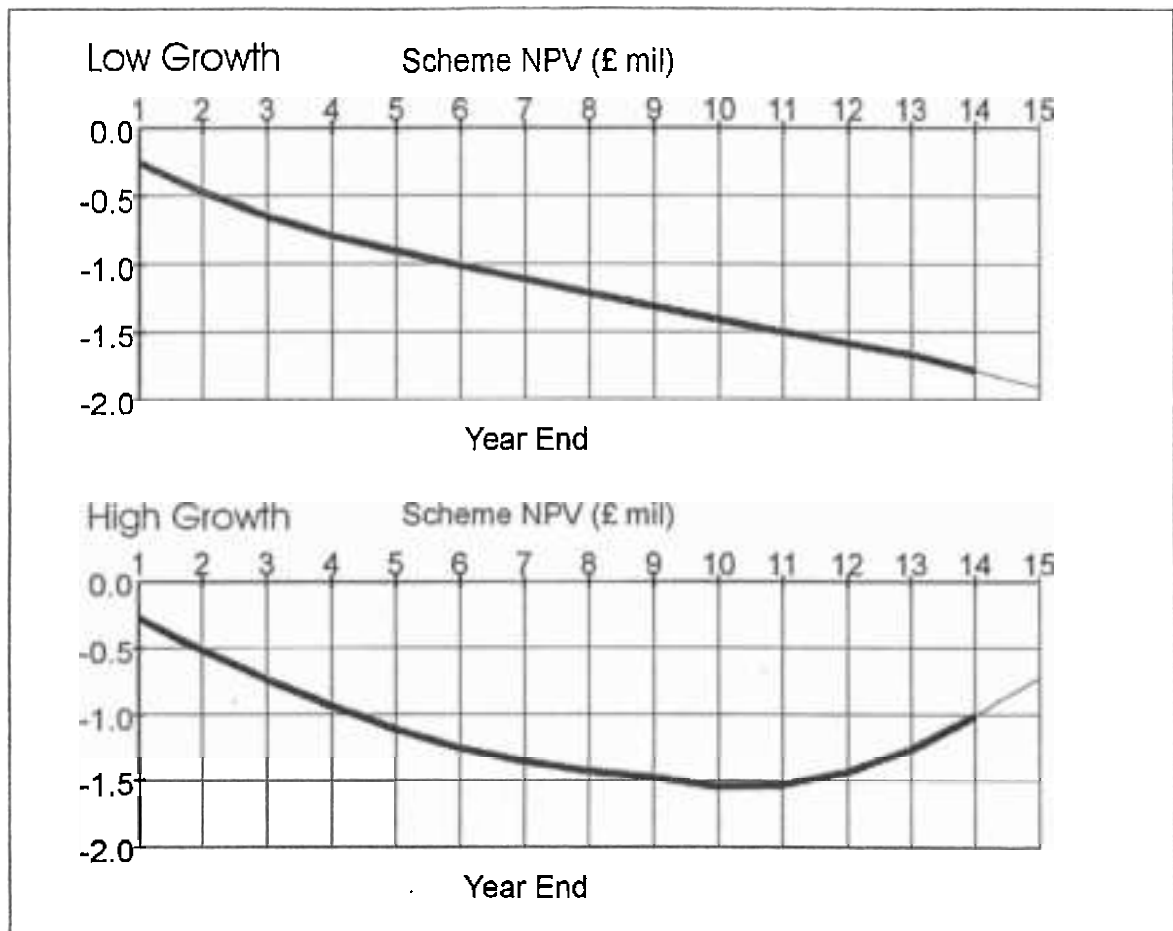


## With Bus Priority

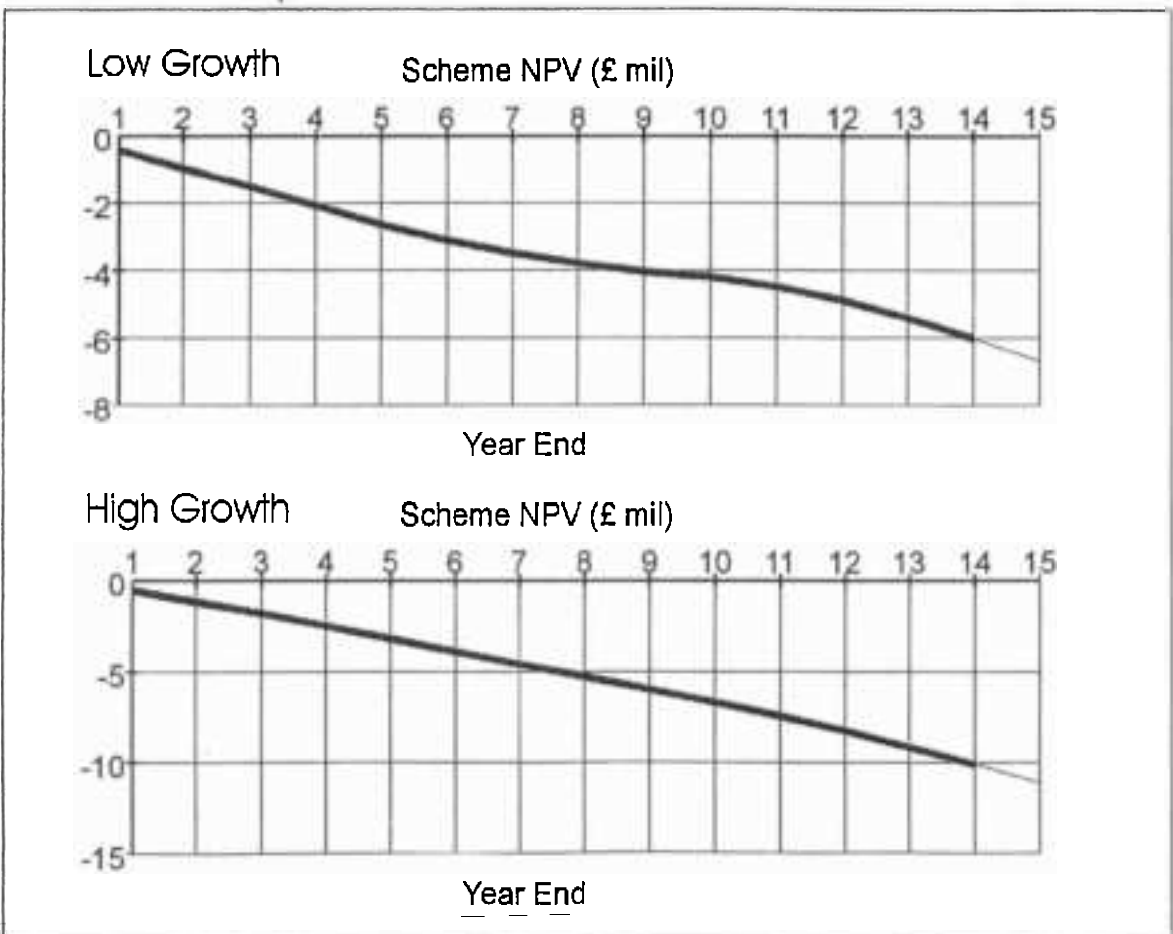




No Bus Priority

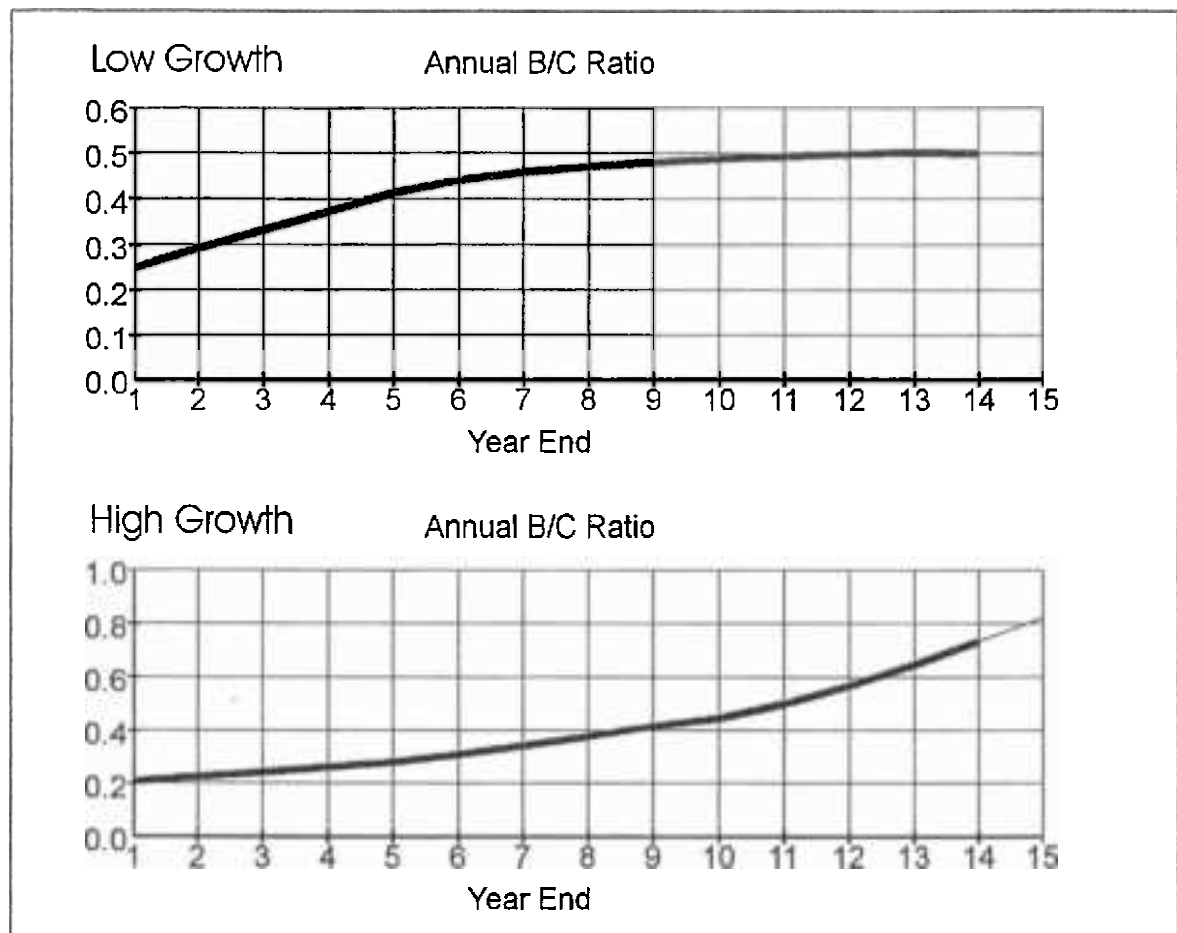


With Bus Priority

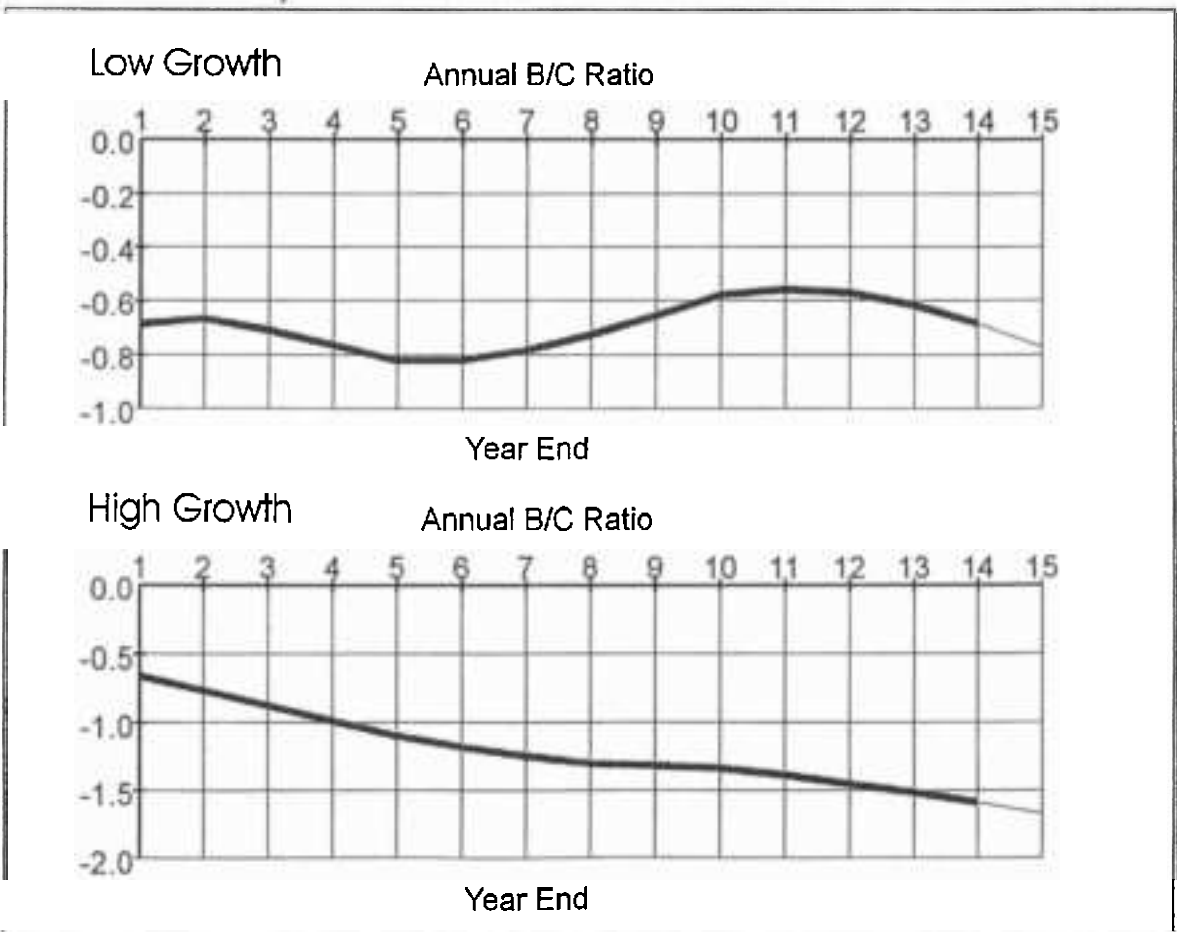


Site 7: B1007  
Annual B/C Ratio (Excluding Capital Costs)

No Bus Priority

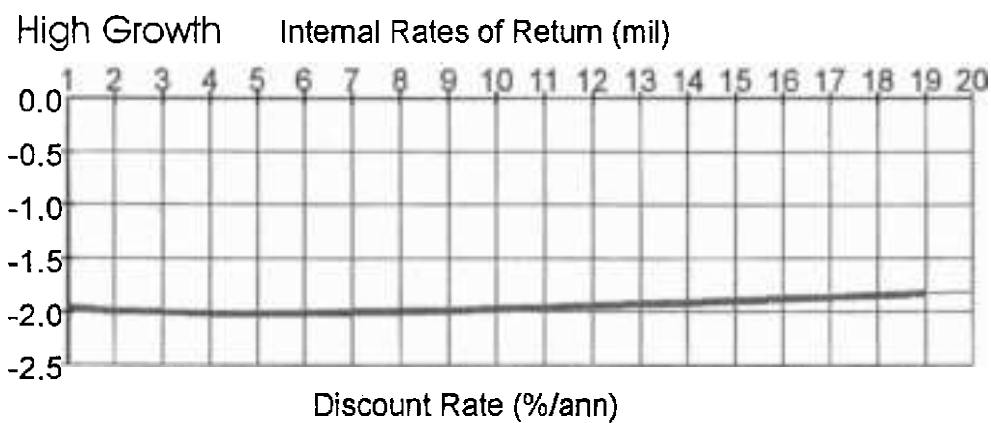
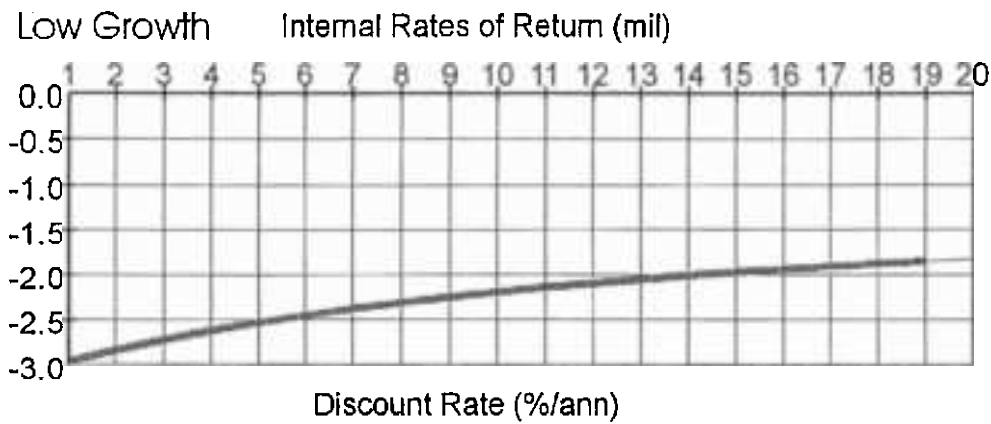


With Bus Priority

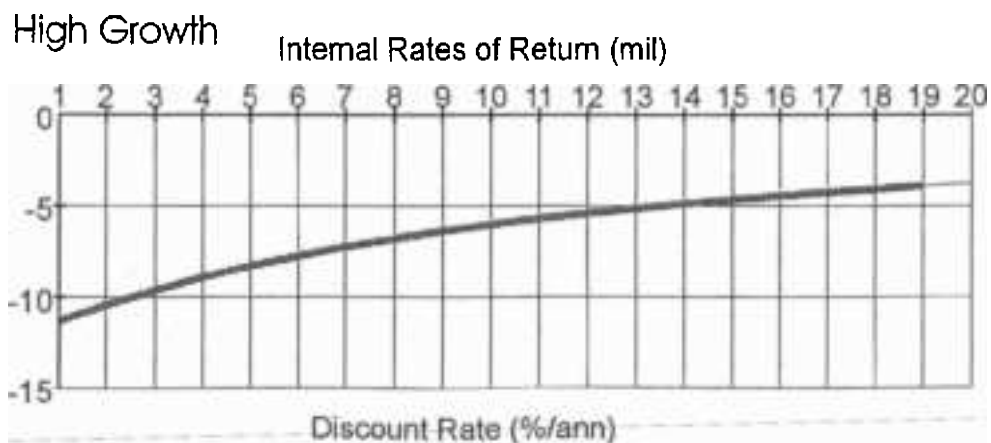
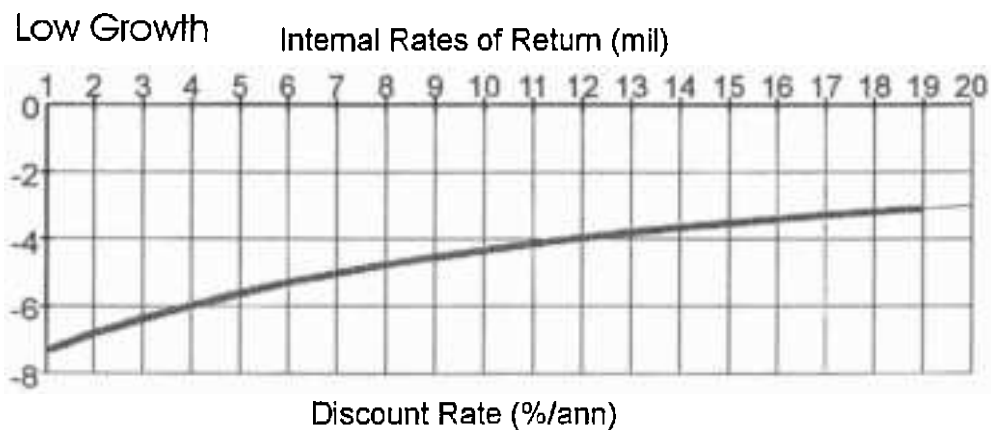


# Internal Rate of Return (Including Capital Costs)

## No Bus Priority

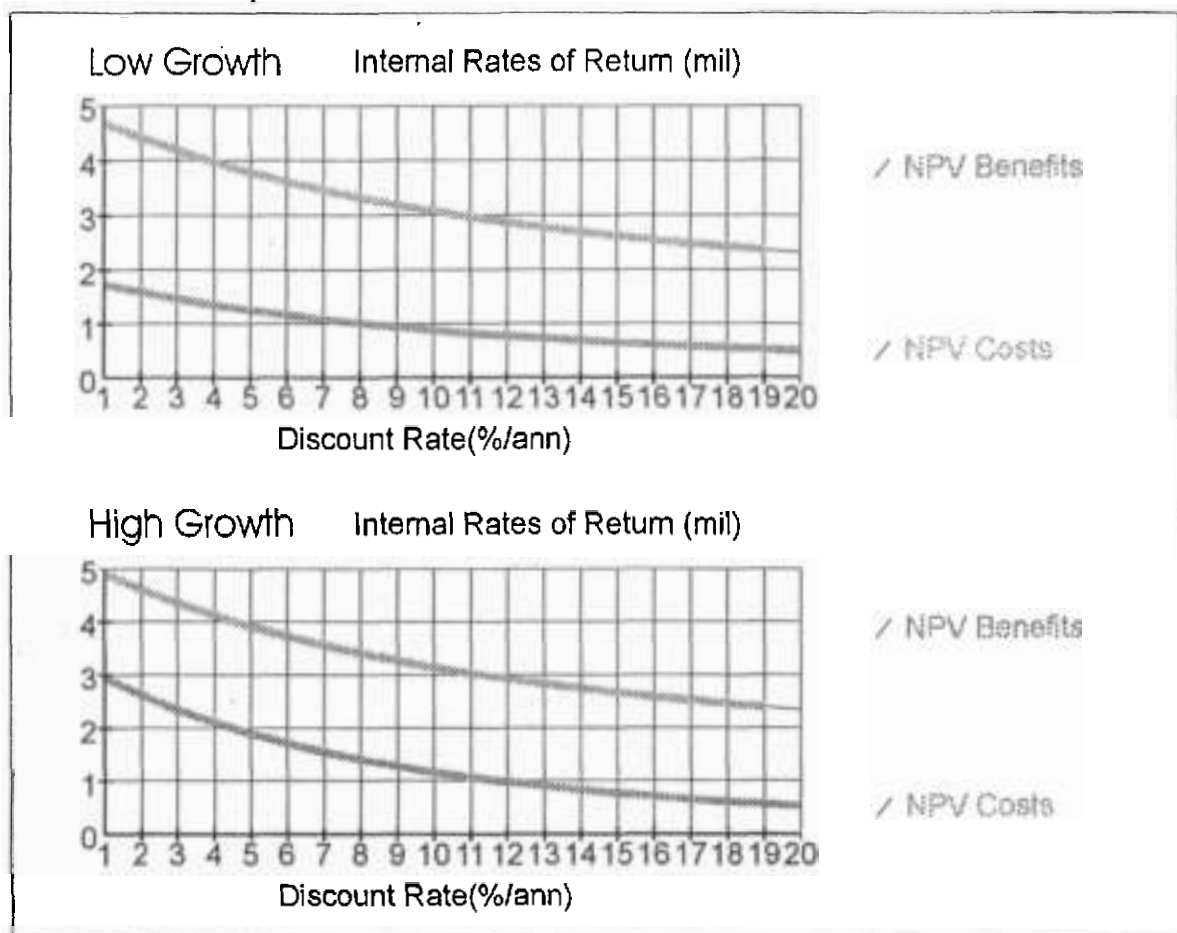


## With Bus Priority

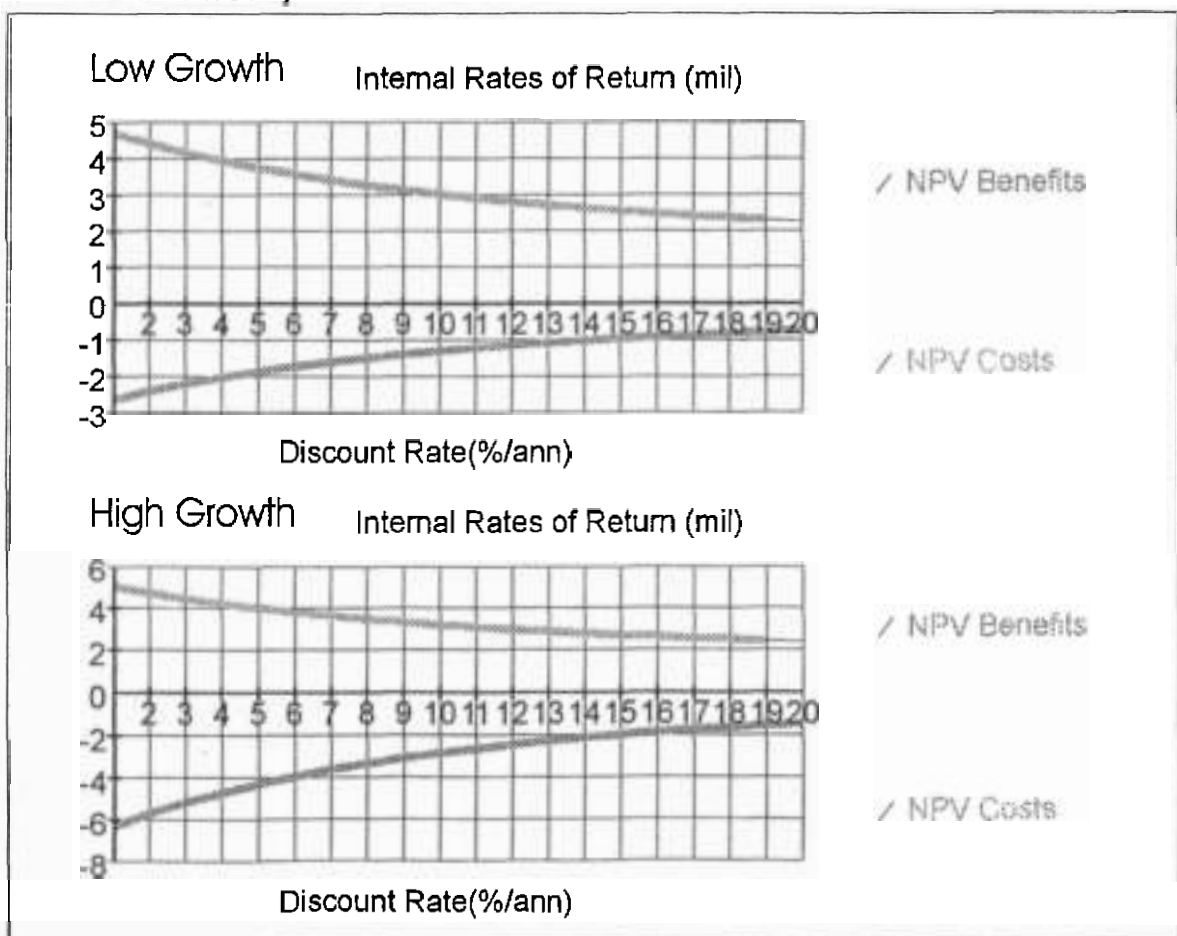


# IRR Costs & Benefits (Including Capital Costs)

## No Bus Priority

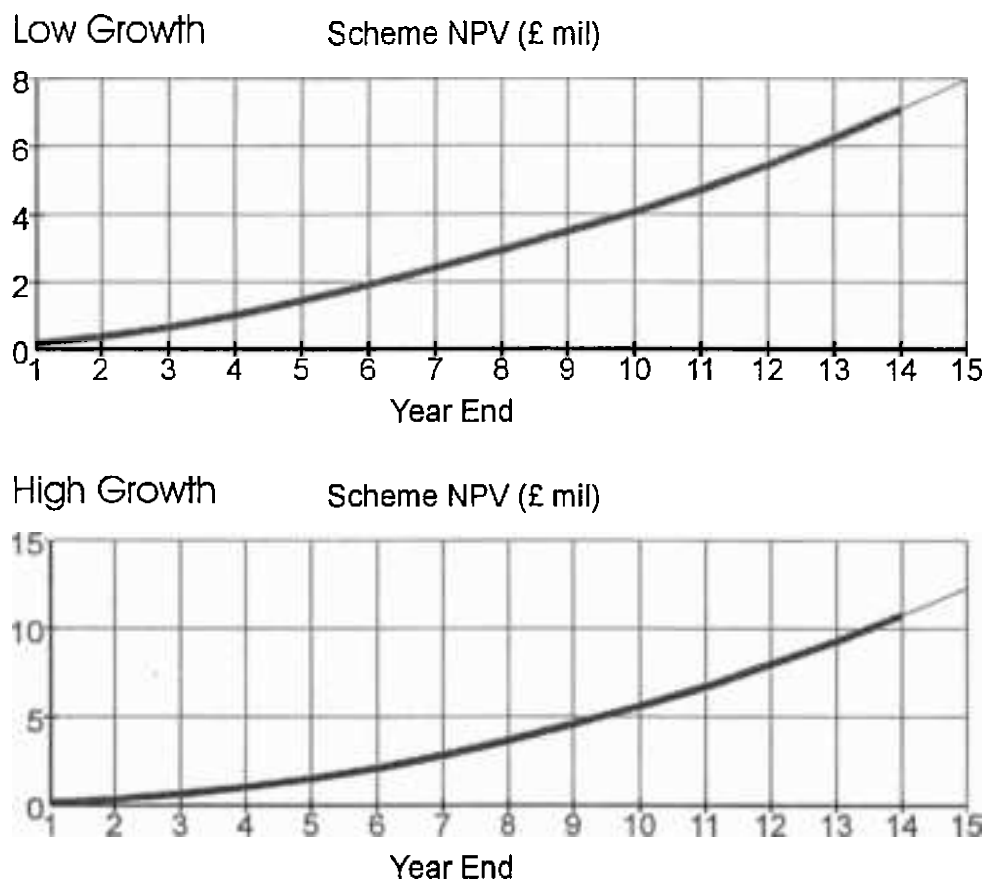


## With Bus Priority

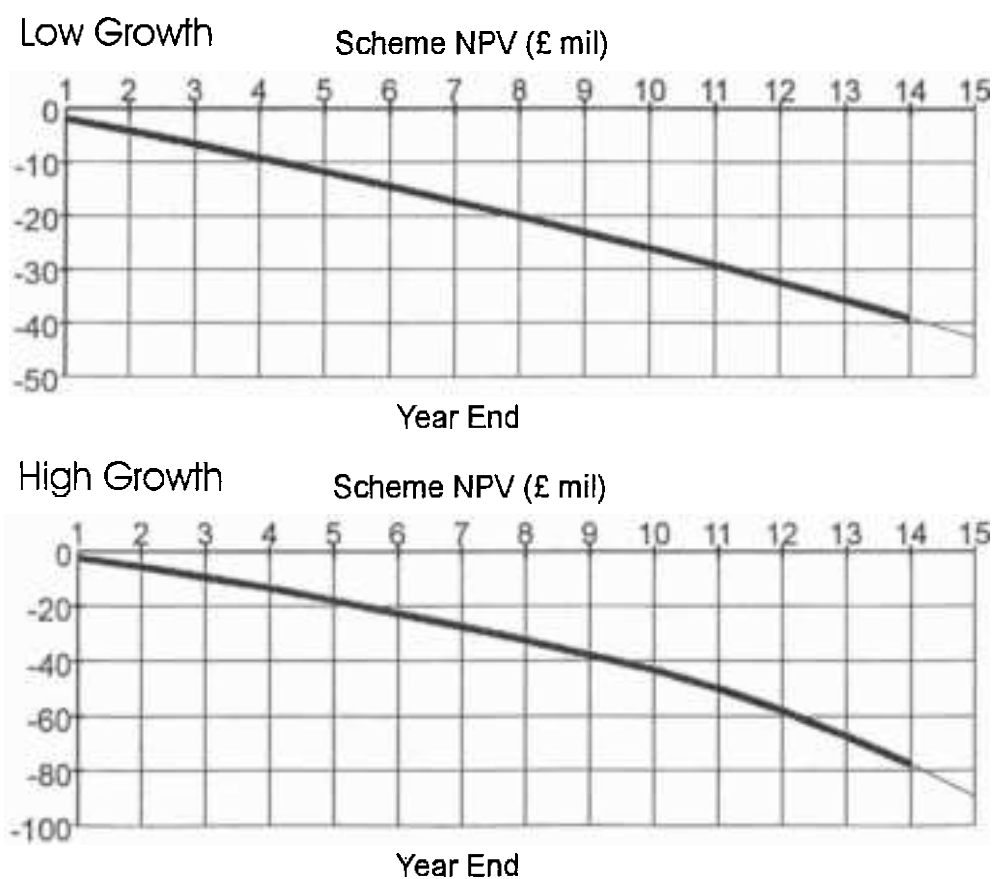


Site 8: A130S  
NPV (Excluding Capital Costs)

No Bus Priority

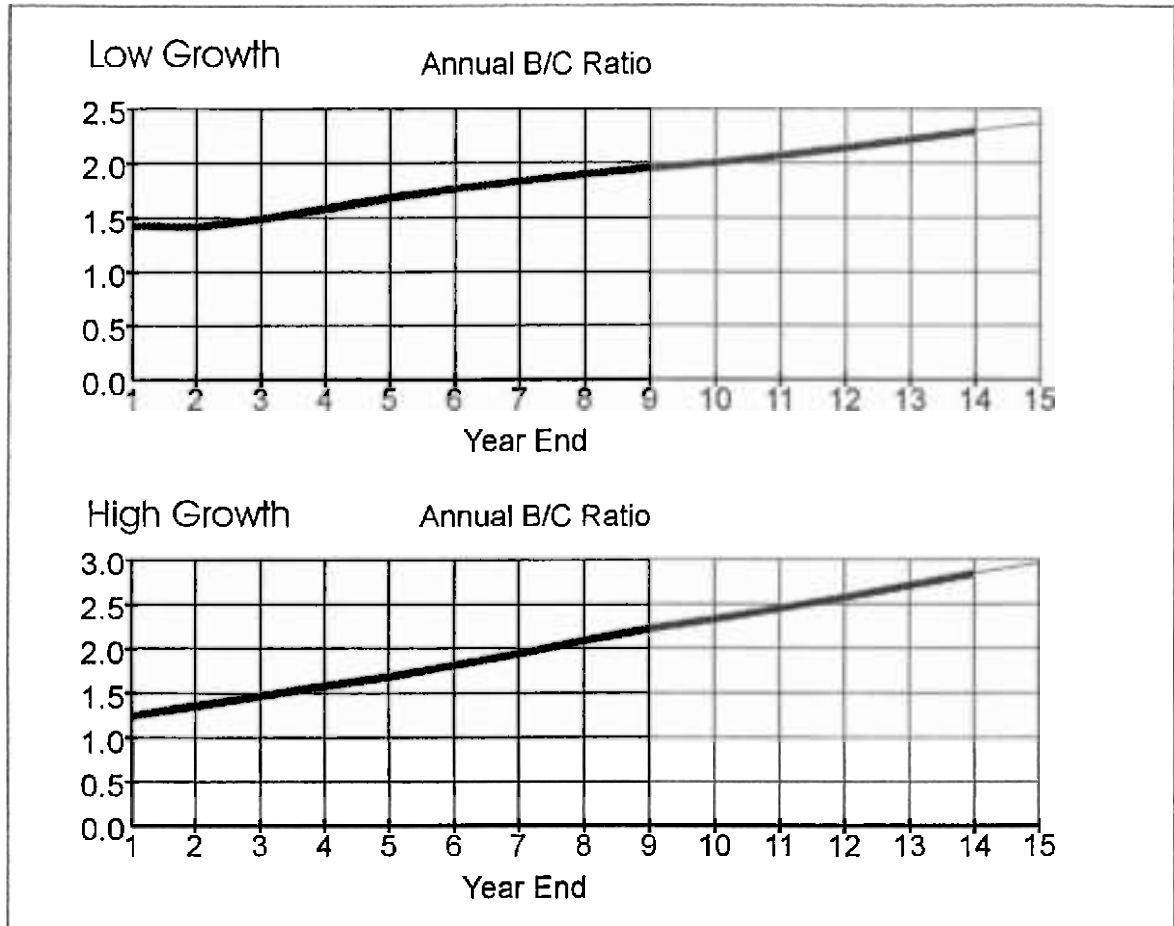


With Bus Priority

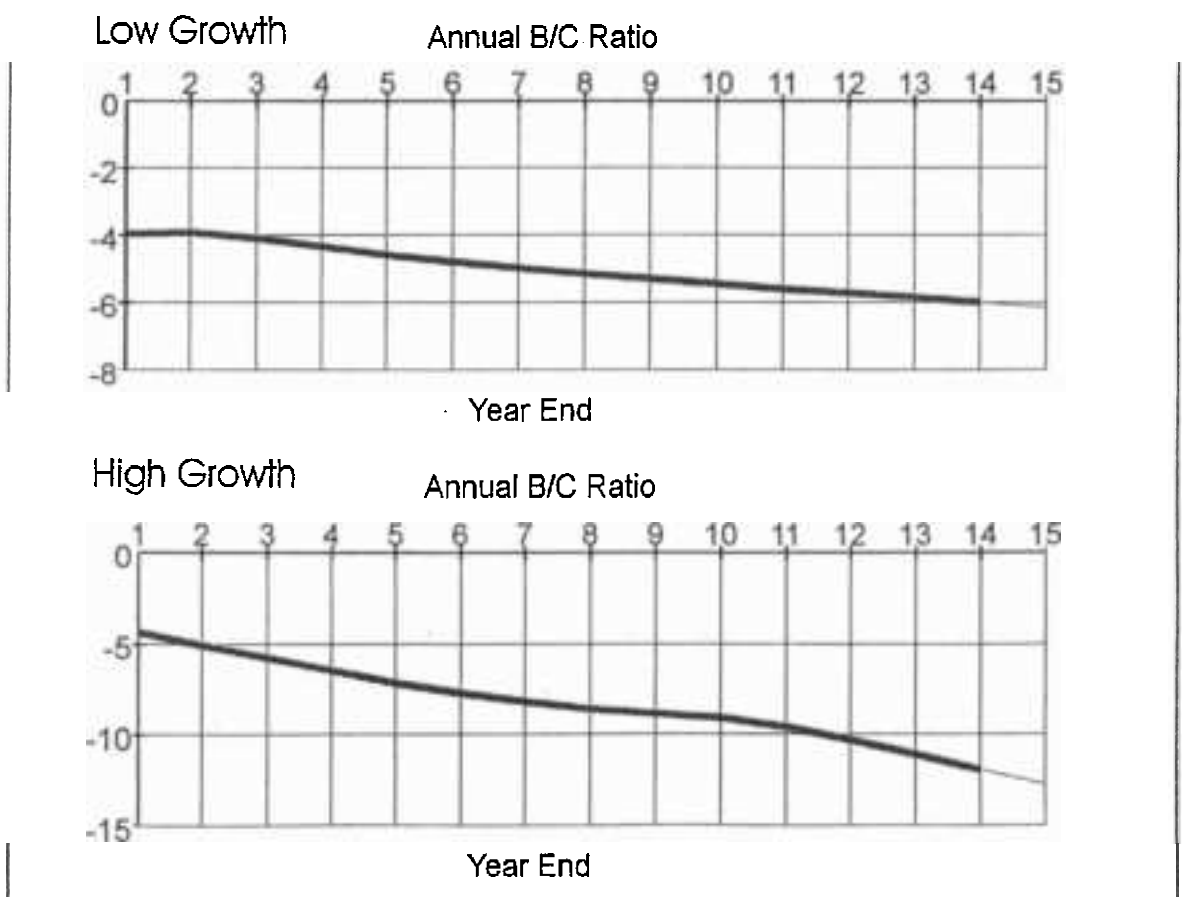


# Annual B/C Ratio (Excluding Capital Costs)

## No Bus Priority

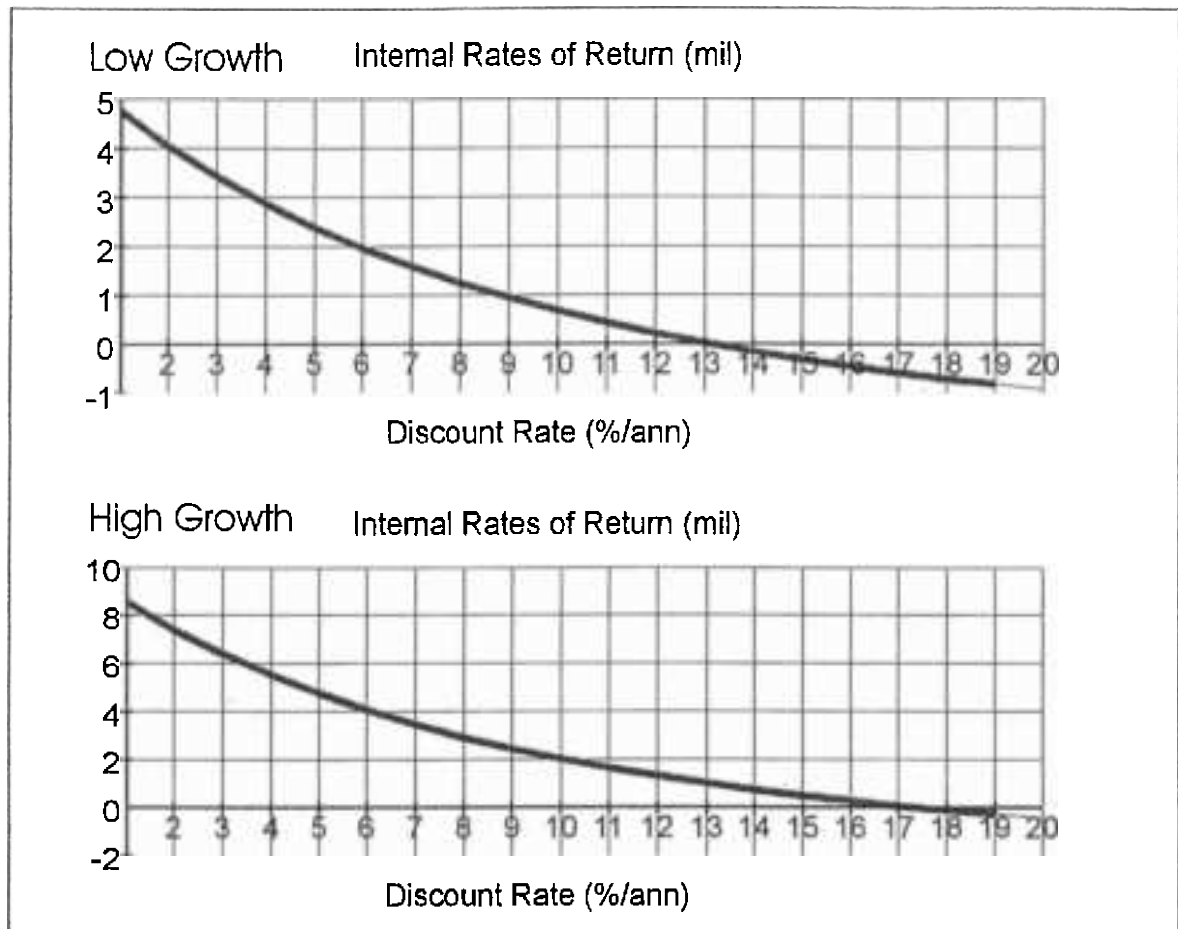


## With Bus Priority

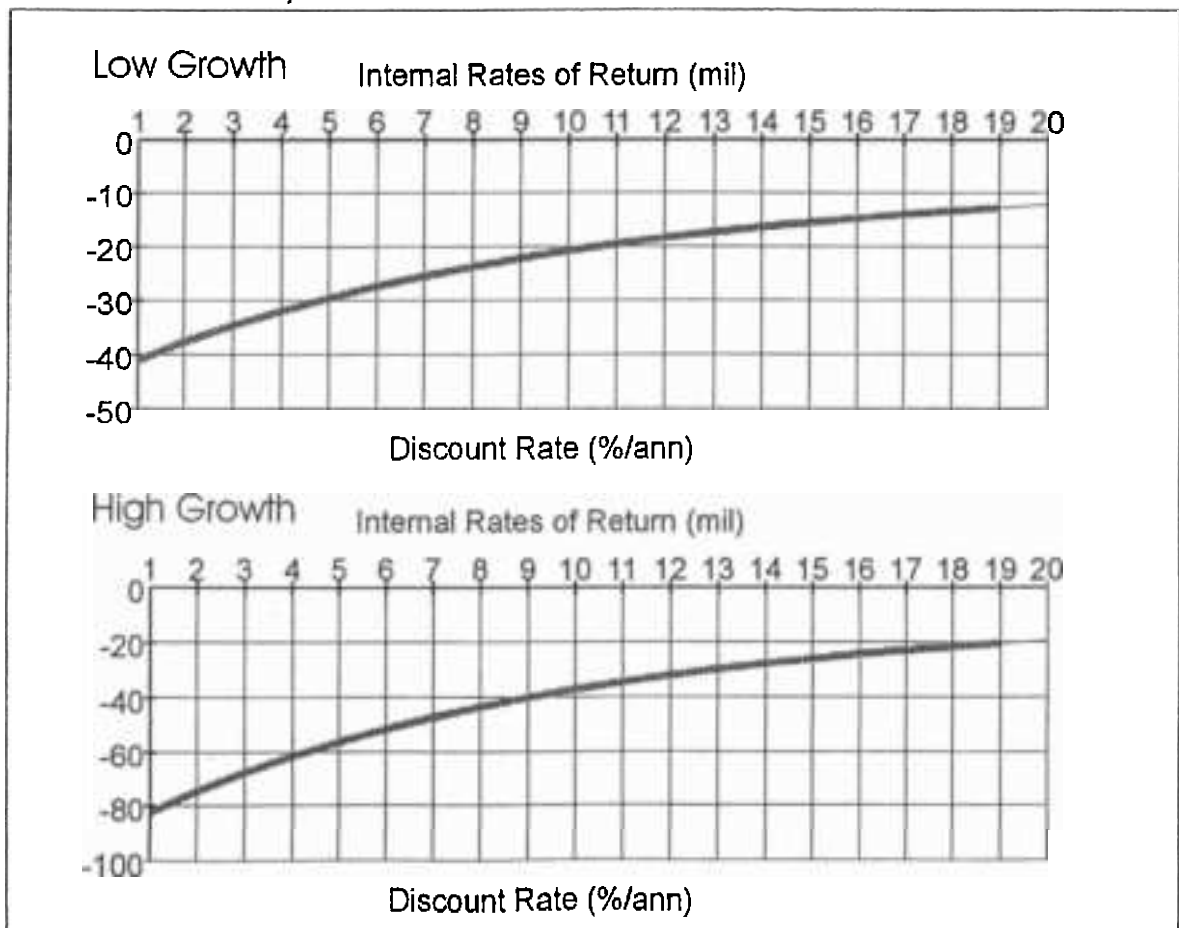


# Internal Rate of Return (Including Capital Costs)

## No Bus Priority

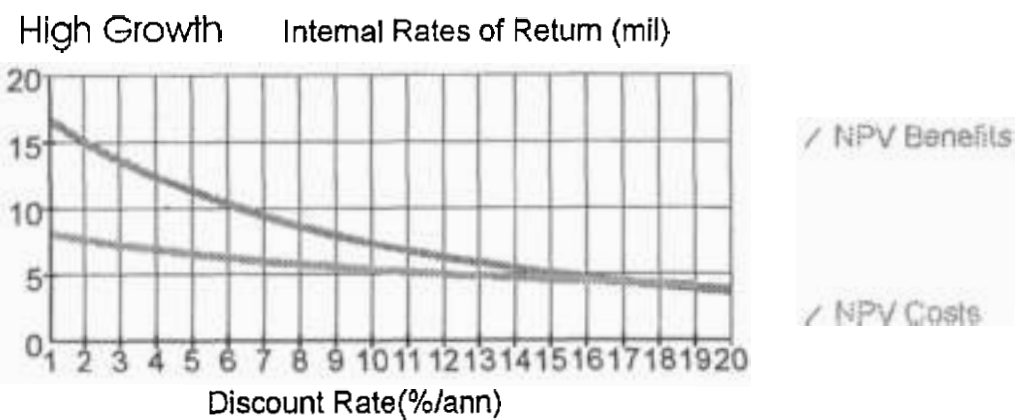
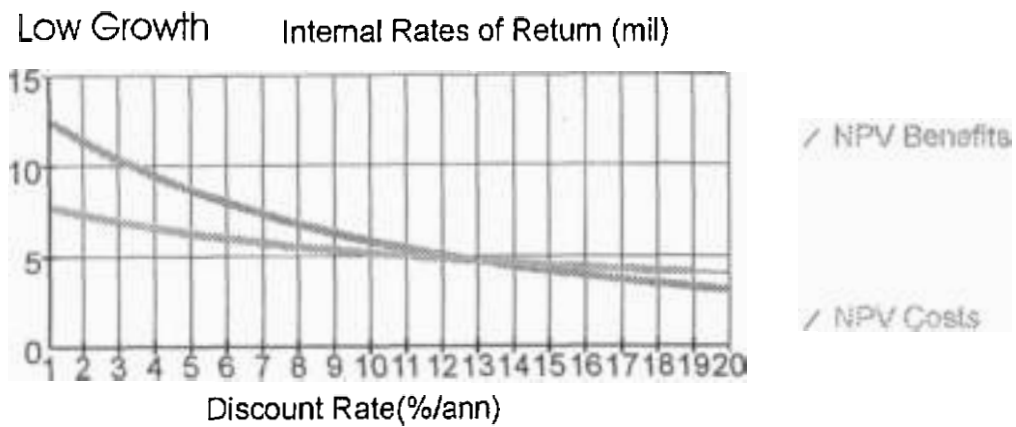


## With Bus Priority

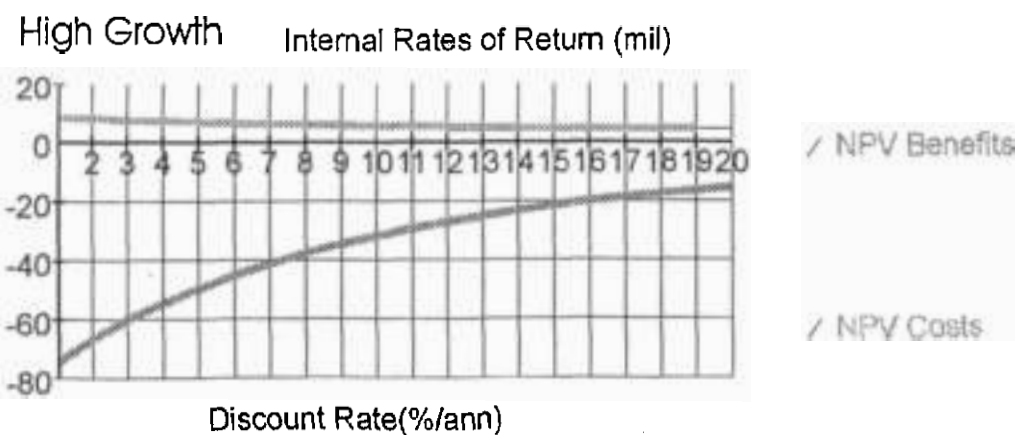
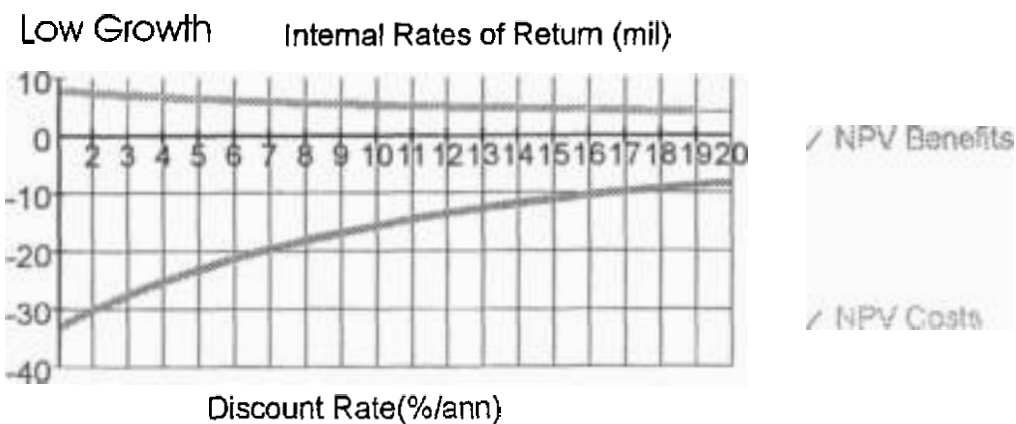


# IRR Costs & Benefits (Including Capital Costs)

## No Bus Priority



## With Bus Priority







**Essex County Council  
Chelmsford Borough Council**

**Chelmsford Park & Ride**

**Finance & Economic Assessment  
Interim Technical Note: TN 04  
March 2001**

[SUPPLEMENTARY REPORT TO  
TECHNICAL NOTE TN 03  
DATED NOVEMBER 2000]

Prepared for:  
Essex County Council,  
County Hall,  
Chelmsford,  
Essex, CM1 1QH

Prepared by:  
WS Atkins Consultants Limited,  
Threadneedle House, 9-10 Market Road,  
CHELMSFORD, CM1 1JQ.

Document Version:      Doc.Reg. - 05      Rev. 0      Issue Date: 26 March 2001

File Reference:    AI/

## **C O N T E N T S**

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**ATTACHEMENTS:        PreMod MODEL SUMMARY OUTPUT RESULTS**

## CHELMSFORD PARK & RIDE FINANCE AND ECONOMIC ASSESSMENT

### 1. INTRODUCTION

This technical note follows on from the initial coarse level assessments into Park & Ride for Chelmsford and concerns supplementary assessments carried out in support of the earlier Technical Note TN 03 Finance and Economic Feasibility Assessments dated November 2000.

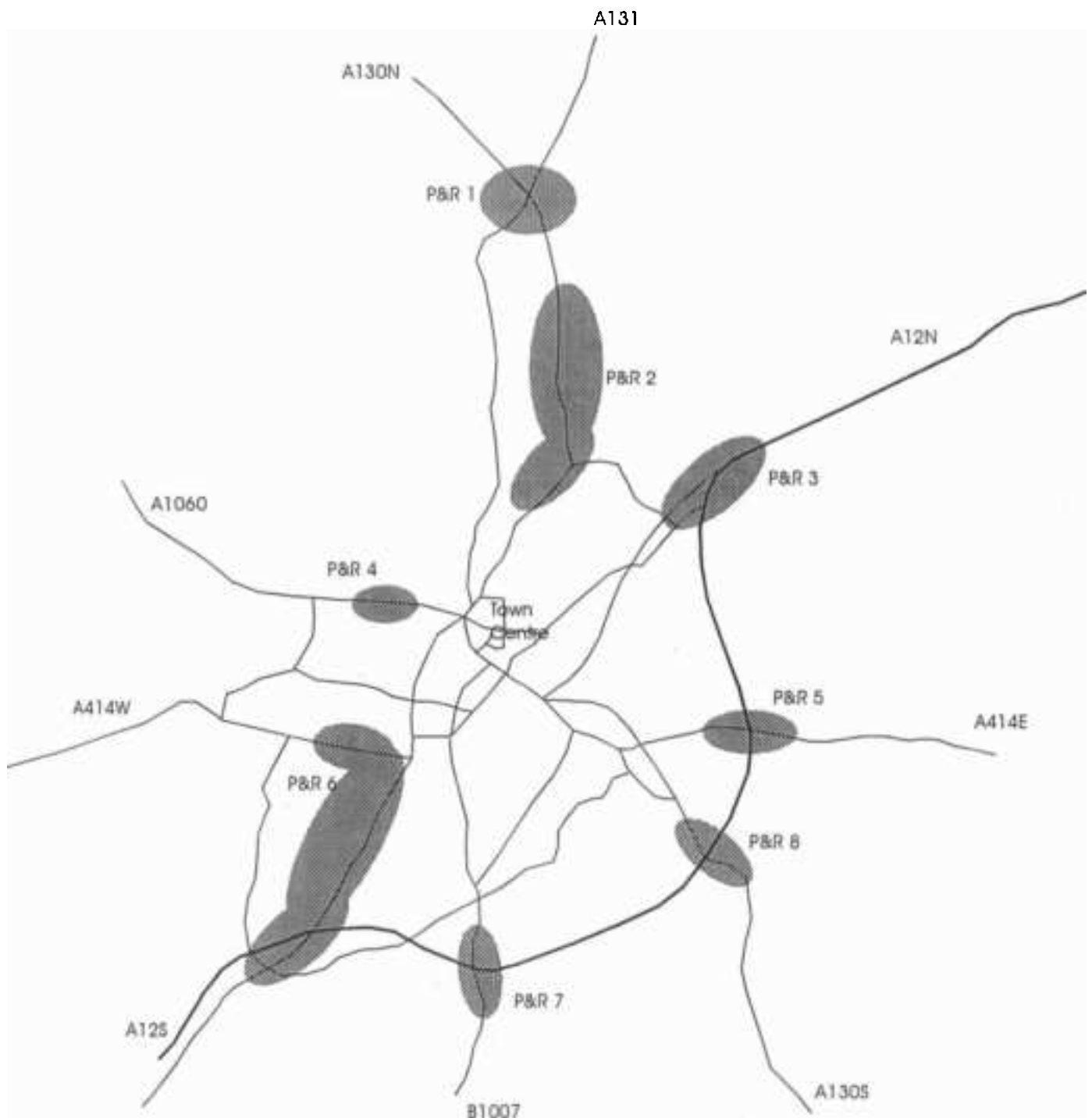
Earlier reports, Technical Notes TN 01 and TN 02, outlined the initial findings on potential demand for Park & Ride based on readily available information. The first of these focused primarily on external trips to and from the study area and used the 1991 Census Journey to Work information as the main data source. The second concentrated on substantiating the earlier findings by providing greater detail on the potential demand for Park & Ride at eight specific sites identified in the study area. The second assessment also made use of the Chelmsford Saturn Traffic Model. The two earlier assessments established a *prima facie* case favouring Park & Ride on the basis of potential demand.

It was accordingly decided to extend the pre-feasibility assessment to also take cognisance of the potential financial and economic performance of the identified sites the results of were reported in Technical Note TN 03. Based on the findings of that assessment it was decided to carry out a supplementary assessment in order to measure the potential affects of parking restraint on the financial and economic performance of the sites. This report summarises the main findings in this regard, as well as the approach and the methodology adopted.

### 2. OBJECTIVES

In carrying the initial traffic modeling for the finance and economic assessments various corridor market share scenarios were tested in terms of the potential impact on the schemes considered. One finding however revealed that on certain corridors the introducing bus priority measures along had a fairly dramatic effect upon scheme economic even at fairly low market share values. The reasons for this are primarily attributable to the associated increased congestion to other road users that the introduction of priority measures will cause.

It was decided that two further factors in the modeling process should be examined to counter balance the above effects. The first relates to the need to simply reduce traffic on the network in order to minimize increased congestion, i.e. to increase Park & Ride market shares to above the base levels initially tested. The second relates to the potential for introducing town center parking restraint measures as an instrument towards achieving higher Park & Ride market shares as well as to generate additional benefits for Park & Ride.



**SCHEME TITLE:**

CHELMSFORD PARK & RIDE STUDY  
Location of Potential Sites

**SCALES:**

NTS

**DATE:** APR '00

FIGURE 1

### 3. METHODOLOGY

A set of "Low" and "Upper" corridor market share profiles were established in order to assess the potential impacts of parking restraint measures. The "Low" corridor market share profile corresponds with the base level tested in the earlier assessments, namely, 4% in the opening year followed by 6%, 8% and 10% in years 5, 10 and 15 respectively. The latter profile is considered for purposes of the assessments to be typical of a no parking restraint in the town center scenario.

In setting up the "Upper" corridor market share profile experience in other towns has been considered. In particular, the Cambridge experience where parking restraint measures have been in force for some time was looked at. Based on this an "Upper" corridor market share profile was established that assumes maximum implementation of parking restraint measures from day-one, namely, 10% in the opening year followed by 30%, 40% and 50% in years 5, 10, and 15 respectively.

The purpose of the establishing the above limiting profile values has been to provide a basis for interpolating the relative impact of alternative market share scenarios that lie within the limiting extremes.

Based on the procedures used in the earlier assessment a series of additional SATURN model runs were carried out to produce results for the "Upper" corridor market share values. Close on 400 SATURN model runs were carried out, combined with the earlier assessment model runs and processed into PreMod data input format to prepare the interpolation database platform for the assessments.

Additional functionality has been added to the PreMod computer model to enable the model to interpolate parking restraint revenues in relation to corridor market share. For simplicity the model assumes a linear elastic relationship with overall journey cost and that the costs function is significantly influence by parking restraint measures, i.e. increase in town center parking charges. While this may or may not be the case and with the possibility of other measures being more effective in this regard, the assumption and inclusion of a counter balance in the model to counteract the impacts of bus priority measures on traffic congestion costs is essential. The model thus provides a useful mechanism to deal with the dynamics of mode shift the above limitation needs to be borne in mind when interpreting the results from the model.

### 4. SUMMARY OF FINDINGS

The results from the PreMod model run for each site and for each of the following scenario are attached to the back of this supplementary report:

- Low Market Share (4%, 6%, 8%, 10%)	Priority ✕	Parking Restraint ✕
- Low Market Share (4%, 6%, 8%, 10%)	Priority ✓	Parking Restraint ✕
- Parking Restraint L1 (4%, 6%, 8%, 30%)	Priority ✓	Parking Restraint ✓
- Parking Restraint L2 (4%, 6%, 20%, 40%)	Priority ✓	Parking Restraint ✓
- Parking Restraint L3 (4%, 10%, 30%, 45%)	Priority ✓	Parking Restraint ✓

The analysis results as appended (first set of results) show the current model evaluations based on the refinements made to PreMod correspond with the earlier assessment results for each of the eight sites. The findings of the earlier assessments as reported in Technical Note TN 03, therefore remain valid.

The main findings from the supplementary assessment relates to the change in the NPV value of each schemes resulting from the introduction of different levels of parking restraint measures as indicated above. These results are summarized on the figure below for each of the eight sites. Note that the bars on the figure reflect the change in the order described above, i.e. low market share without and with parking restraint followed by the three levels of parking restraint.

The value of parking restraint has been based on the following factors in relation to current parking charges as set in the PreMod parameter input data file:

- No parking restraint:
  - All Fac = 1
- With parking restraint (Peak and Off-Peak)
  - Short stay Fac = 1.5
  - Long stay Fac = 2.9
  - All-day Fac = 6.25

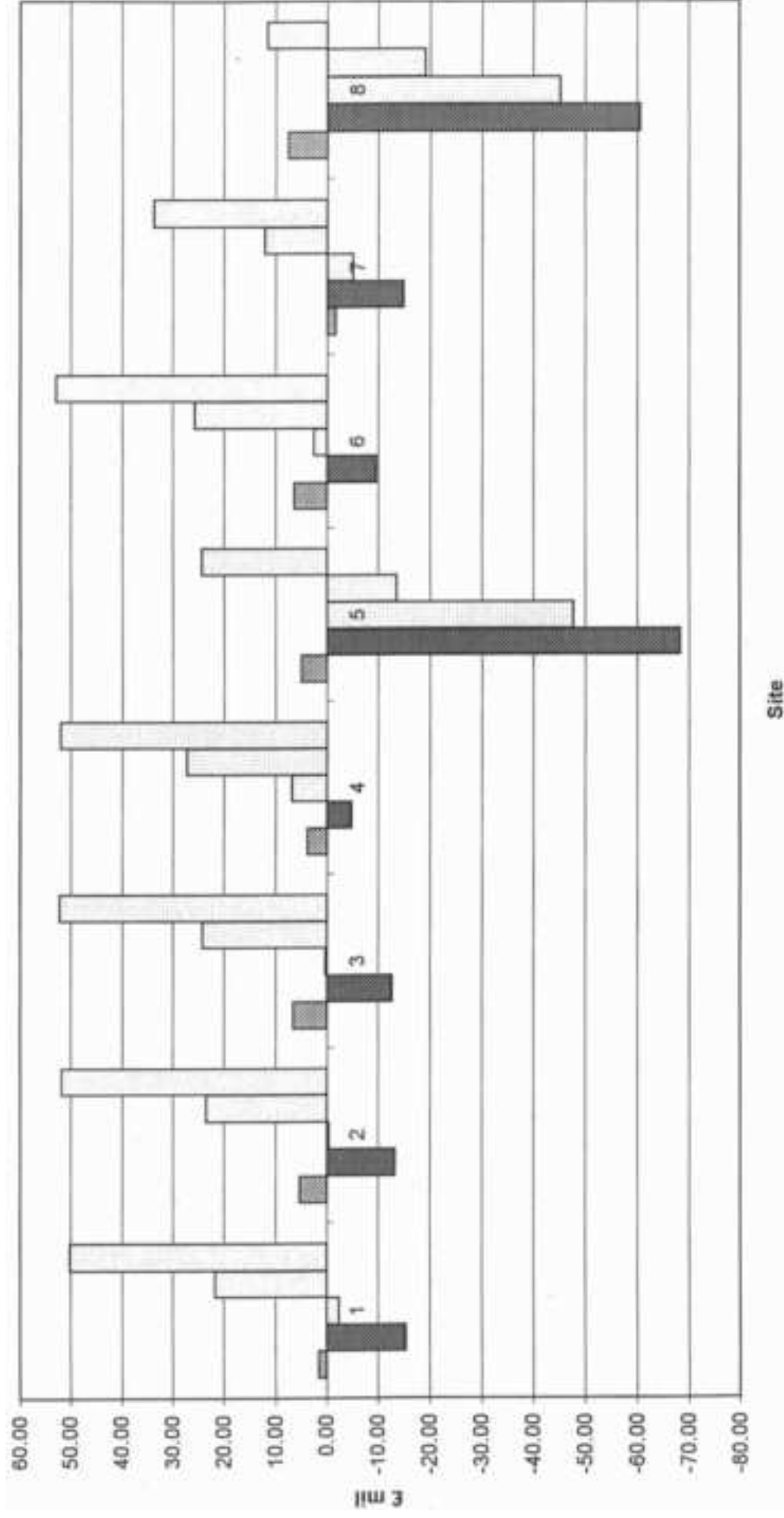
Note that the parking restraint revenues in the financial and economic evaluations equate to excess revenue over and above exiting charge levels.

A further point to note is the premise employed in the model that applying parking restraint measures is generally universal in the sense that it cannot be applied on a corridor basis. It is therefore assumed that in the longer term most corridors would cater for Park & Ride. To compensate for this the model applies only 0.6 of the overall parking restraint revenues derived on a corridor basis in the calculations.

The following salient findings arise from the assessment results:

- Consistent with the earlier assessment, all sites with the exception of Site 7 (B1007) show positive NPV values at the end of the scheme life (15 years) in the scenario of low market share and with no bus priority measures applied. (Refer to the first bar on the left of the figure.) It is however unlikely that Park & Ride would even get off the ground were bus priority measures not applied.
- The introduction of bus priority, and in particular at low Park & Ride market share values, has enormous impact on the NPV for all schemes primarily resulting from the cost of delays to other road users. (Refer to the second bar from the left on the figure.) In particular, Sites 5 (A414E) and 8 (A130S) are worst affected in terms of increased congestion.
- The effect of introducing parking restraint of gradually increasing severity is depicted in the last three bars for each site on the figure. The degrees of severity are as indicated in the successive scenario market shares above.

NPV - Low Growth Scenario (See Report for Details)  
 Showing No Priority / With Priority No Parking Restraint / With Priority and Parking Restraint





- The results suggest that for most sites with the exception of Sites 5 and 8, only a moderate parking restraint strategy may required to ensure a positive NPV outcome, i.e. the introduction of parking restraint measures between years 5 and 10. In contrast the results suggest that in the case of Sites 5 and 8 a more aggressive parking restraint strategy may be needed to achieve a similar outcome with regard to the overall NPV values for the scheme.

## 5. CONCLUSIONS

The supplementary assessment finding generally support the earlier assessment findings and conclusions, and provide additional perspective as to the potential for parking restraint measures to counter balance the effect of bus priority measures on congestion.

---

PREMod Results Site 1: A130 North (Outer)  
26/03/2001 11:56:05

.....  
FILE REFERENCE:

Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site1.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat

.....  
OPTION SELECTION:

Traffic Growth: Low  
With Bus Priority: No  
Include Inter-Urban: No  
Parking Charges: No  
User Charges: No  
P&R Market Share: 4%, 6%, 8%, 10%

.....  
BASE PARAMETERS:

Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20

YEAR 1:

Average Daily Demand = 148  
Annual Demand = 36,945  
Discount Rate = 6.00%

Spaces in YEAR 15 = 317  
Evaluation P&R Size = 400  
Num Buses Required = 6

.....  
Capital Cost = £ 1,800,000  
(Scheme Life = 15 Years)

---

COST/BENEFIT ASSESSMENT:

PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -3,842,850  
A: Parking Revenue = £ -615,432  
U: P&R Charges = £ -649,298

Total Cost = £ -5,657,330

PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 615,432  
O: P&R Charges = £ 649,298  
U: HGV VOC Savings = £ 45,960  
U: Car VOC Savings = £ 397,992  
U: Congestion Savings = £ 4,616,577  
U: Accident Savings = £ 780,303  
A: NM Parking Charges = £ 0

Total Benefits = £ 7,105,563

NET PRESENT VALUE (NPV) = £ 1,448,233

---

B/C INDICATORS

Operating B/C Ratio\* = 0.44  
Economic B/C Ratio\*\* = 1.26

IRR INDICATORS

IRR\*\*\* = -999.00

FIRST YEAR INDICATORS

PVC\* = -473932.63  
PVB\* = 134919.38  
Operating B/C Ratio\* = 0.28

PVC\*\* = -473932.63  
PVB\*\* = 328383.41  
Economic B/C Ratio\*\* = 0.69

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---

PREMod Results Site 2: A130 North (Inner)  
26/03/2001 11:56:14

.....  
FILE REFERENCE:  
Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site2.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat  
.....

OPTION SELECTION:  
Traffic Growth: Low  
With Bus Priority: No  
Include Inter-Urban: No  
Parking Charges: No  
User Charges: No  
P&R Market Share: 4%, 6%, 8%, 10%  
.....

BASE PARAMETERS:  
Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20

YEAR 1:  
Average Daily Demand = 241  
Annual Demand = 60,250  
Discount Rate = 6.00%

Spaces in YEAR 15 = 484  
Evaluation P&R Size = 600  
Num Buses Required = 2

.....  
Capital Cost = £ 2,400,000  
(Scheme Life = 15 Years)

---

#### COST/BENEFIT ASSESSMENT:

PRESENT VALUE COSTS (PVC)  
A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -1,745,328  
A: Parking Revenue = £ -1,022,184  
U: P&R Charges = £ -1,017,021  
  
Total Cost = £ -4,334,283

PRESENT VALUE BENEFITS (PVB)  
U: Parking Charges = £ 1,022,184  
O: P&R Charges = £ 1,017,021  
U: HGV VOC Savings = £ 66,827  
U: Car VOC Savings = £ 620,240  
U: Congestion Savings = £ 5,650,440  
U: Accident Savings = £ 1,238,964  
A: NM Parking Charges = £ 0

Total Benefits = £ 9,615,677

NET PRESENT VALUE (NPV) = £ 5,281,393

---

#### B/C INDICATORS

Operating B/C Ratio\* = 0.91  
Economic B/C Ratio\*\* = 2.22

#### IRR INDICATORS

IRR\*\*\* = 8.05

#### FIRST YEAR INDICATORS

PVC\* = -352514.27  
PVB\* = 204917.98  
Operating B/C Ratio\* = 0.58

PVC\*\* = -352514.27  
PVB\*\* = 407421.36  
Economic B/C Ratio\*\* = 1.16

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---

.....  
FILE REFERENCE:

Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site3.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat

.....  
OPTION SELECTION:

Traffic Growth: Low  
With Bus Priority: No  
Include Inter-Urban: No  
Parking Charges: No  
User Charges: No  
P&R Market Share: 4%, 6%, 8%, 10%

.....  
BASE PARAMETERS:

Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20

YEAR 1:

Average Daily Demand = 213  
Annual Demand = 53,188  
Discount Rate = 6.00%

Spaces in YEAR 15 = 490  
Evaluation P&R Size = 600  
Num Buses Required = 4

.....  
Capital Cost = £ 2,400,000  
(Scheme Life = 15 Years)

---

COST/BENEFIT ASSESSMENT:

PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -2,782,005  
A: Parking Revenue = £ -869,913  
U: P&R Charges = £ -985,213

Total Cost = £ -5,186,881

PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 869,913  
O: P&R Charges = £ 985,213  
U: HGV VOC Savings = £ 60,046  
U: Car VOC Savings = £ 515,367  
U: Congestion Savings = £ 8,322,811  
U: Accident Savings = £ 1,000,196  
A: NM Parking Charges = £ 0

Total Benefits = £ 11,753,546

NET PRESENT VALUE (NPV) = £ 6,566,665

---

B/C INDICATORS

Operating B/C Ratio\* = 0.66  
Economic B/C Ratio\*\* = 2.27

IRR INDICATORS

IRR\*\*\* = 10.06

FIRST YEAR INDICATORS

PVC\* = -427692.87  
PVB\* = 196817.10  
Operating B/C Ratio\* = 0.46

PVC\*\* = -427692.87  
PVB\*\* = 534031.78  
Economic B/C Ratio\*\* = 1.25

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---

26/03/2001 12:02:02

.....

## FILE REFERENCE:

Parameter File: C:\P&RModel\Data\HighMS.par  
 Site File: C:\P&RModel\Data\Site4.def  
 COBA File: C:\P&RModel\Data\Coba.def  
 Do-Nothing File: C:\P&RModel\Data\DN.dat

.....

## OPTION SELECTION:

Traffic Growth: Low  
 With Bus Priority: No  
 Include Inter-Urban: No  
 Parking Charges: No  
 User Charges: No  
 P&R Market Share: 4%, 6%, 8%, 10%

.....

## BASE PARAMETERS:

Fare Levels (pence) = 80  
 Peak Headway (min) = 10  
 Off-Peak Headway (min) = 20

## YEAR 1:

Average Daily Demand = 125  
 Annual Demand = 31,153  
 Discount Rate = 6.00%

Spaces in YEAR 15 = 281  
 Evaluation P&R Size = 400  
 Num Buses Required = 2

.....

Capital Cost = £ 1,800,000  
 (Scheme Life = 15 Years)

---

COST/BENEFIT ASSESSMENT:

## PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
 O: Bus Operating Cost = £ -949,898  
 A: Parking Revenue = £ -519,832  
 U: P&R Charges = £ -569,296

Total Cost = £ -2,588,776

## PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 519,832  
 O: P&R Charges = £ 569,296  
 U: HGV VOC Savings = £ 29,642  
 U: Car VOC Savings = £ 253,467  
 U: Congestion Savings = £ 4,483,604  
 U: Accident Savings = £ 496,014  
 A: NM Parking Charges = £ 0

Total Benefits = £ 6,351,856

NET PRESENT VALUE (NPV) = £ 3,763,081

---

B/C INDICATORS

Operating B/C Ratio\* = 0.72  
 Economic B/C Ratio\*\* = 2.45

## IRR INDICATORS

IRR\*\*\* = 11.90

## FIRST YEAR INDICATORS

PVC\* = -208411.22  
 PVB\* = 92537.46  
 Operating B/C Ratio\* = 0.44

PVC\*\* = -208411.22  
 PVB\*\* = 258318.86  
 Economic B/C Ratio\*\* = 1.24

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---

PREMod Results Site 5: A414 East  
26/03/2001 12:02:22

.....  
FILE REFERENCE:

Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site5.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat

.....  
OPTION SELECTION:

Traffic Growth: Low  
With Bus Priority: No  
Include Inter-Urban: No  
Parking Charges: No  
User Charges: No  
P&R Market Share: 4%, 6%, 8%, 10%

.....  
BASE PARAMETERS:

Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20

YEAR 1:

Average Daily Demand = 224  
Annual Demand = 56,086  
Discount Rate = 6.00%

Spaces in YEAR 15 = 475  
Evaluation P&R Size = 600  
Num Buses Required = 4

.....  
Capital Cost = £ 2,400,000  
(Scheme Life = 15 Years)

---

COST/BENEFIT ASSESSMENT:

PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -2,490,750  
A: Parking Revenue = £ -942,584  
U: P&R Charges = £ -994,605

Total Cost = £ -4,977,688

PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 942,584  
O: P&R Charges = £ 994,605  
U: HGV VOC Savings = £ 47,120  
U: Car VOC Savings = £ 419,286  
U: Congestion Savings = £ 6,668,031  
U: Accident Savings = £ 811,257  
A: NM Parking Charges = £ 0

Total Benefits = £ 9,882,882

NET PRESENT VALUE (NPV) = £ 4,905,194

---

B/C INDICATORS

Operating B/C Ratio\* = 0.65  
Economic B/C Ratio\*\* = 1.99

IRR INDICATORS

IRR\*\*\* = 9.02

FIRST YEAR INDICATORS

PVC\* = -349125.13  
PVB\* = 191228.05  
Operating B/C Ratio\* = 0.55

PVC\*\* = -349125.13  
PVB\*\* = 377957.68  
Economic B/C Ratio\*\* = 1.08

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---

PREMod Results Site 6: A414 West  
26/03/2001 12:02:36

.....  
FILE REFERENCE:

Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site6.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat

.....  
OPTION SELECTION:

Traffic Growth: Low  
With Bus Priority: No  
Include Inter-Urban: No  
Parking Charges: No  
User Charges: No  
P&R Market Share: 4%, 6%, 8%, 10%

.....  
BASE PARAMETERS:

Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20

YEAR 1:

Average Daily Demand = 335  
Annual Demand = 83,771  
Discount Rate = 6.00%

Spaces in YEAR 15 = 632  
Evaluation P&R Size = 800  
Num Buses Required = 2

.....  
Capital Cost = £ 3,000,000  
(Scheme Life = 15 Years)

---

COST/BENEFIT ASSESSMENT:

PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -1,745,328  
A: Parking Revenue = £ -1,450,168  
U: P&R Charges = £ -1,352,189

Total Cost = £ -5,097,435

PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 1,450,168  
O: P&R Charges = £ 1,352,189  
U: HGV VOC Savings = £ 49,988  
U: Car VOC Savings = £ 470,964  
U: Congestion Savings = £ 7,172,368  
U: Accident Savings = £ 913,973  
A: NM Parking Charges = £ 0

Total Benefits = £ 11,409,649

NET PRESENT VALUE (NPV) = £ 6,312,215

---

B/C INDICATORS

Operating B/C Ratio\* = 0.83  
Economic B/C Ratio\*\* = 2.24

IRR INDICATORS

IRR\*\*\* = 8.79

FIRST YEAR INDICATORS

PVC\* = -404720.23  
PVB\* = 249578.49  
Operating B/C Ratio\* = 0.62

PVC\*\* = -404720.23  
PVB\*\* = 514478.39  
Economic B/C Ratio\*\* = 1.27

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---

PREMod Results Site 7: A12 South  
26/03/2001 12:03:12

.....  
FILE REFERENCE:  
Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site7.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat  
.....

OPTION SELECTION:  
Traffic Growth: Low  
With Bus Priority: No  
Include Inter-Urban: No  
Parking Charges: No  
User Charges: No  
P&R Market Share: 4%, 6%, 8%, 10%  
.....

BASE PARAMETERS:  
Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20

YEAR 1:  
Average Daily Demand = 84  
Annual Demand = 21,114  
Discount Rate = 6.00%

Spaces in YEAR 15 = 135  
Evaluation P&R Size = 200  
Num Buses Required = 4

.....  
Capital Cost = £ 1,200,000  
(Scheme Life = 15 Years)

---

COST/BENEFIT ASSESSMENT:

PRESENT VALUE COSTS (PVC)  
A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -2,695,225  
A: Parking Revenue = £ -386,371  
U: P&R Charges = £ -278,875  
  
Total Cost = £ -3,910,221

PRESENT VALUE BENEFITS (PVB)  
U: Parking Charges = £ 386,371  
O: P&R Charges = £ 278,875  
U: HGV VOC Savings = £ 17,161  
U: Car VOC Savings = £ 157,840  
U: Congestion Savings = £ 1,130,735  
U: Accident Savings = £ 300,899  
A: NM Parking Charges = £ 0

Total Benefits = £ 2,271,880

NET PRESENT VALUE (NPV) = £ -1,638,341

---

B/C INDICATORS

Operating B/C Ratio\* = 0.29  
Economic B/C Ratio\*\* = 0.58

IRR INDICATORS

IRR\*\*\* = -999.00

FIRST YEAR INDICATORS

PVC\* = -349007.27  
PVB\* = 59934.90  
Operating B/C Ratio\* = 0.17

PVC\*\* = -349007.27  
PVB\*\* = 143931.45  
Economic B/C Ratio\*\* = 0.41

\* Excludes Congestion Savings  
\*\* Includes Congestion Savings  
\*\*\* Includes Capital Cost & Congestion Savings



.....  
FILE REFERENCE:

Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site8.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat

.....  
OPTION SELECTION:

Traffic Growth: Low  
With Bus Priority: No  
Include Inter-Urban: No  
Parking Charges: No  
User Charges: No  
P&R Market Share: 4%, 6%, 8%, 10%

.....  
BASE PARAMETERS:

Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20

YEAR 1:

Average Daily Demand = 340  
Annual Demand = 85,034  
Discount Rate = 6.00%

Spaces in YEAR 15 = 681  
Evaluation P&R Size = 800  
Num Buses Required = 4

.....  
Capital Cost = £ 3,000,000  
(Scheme Life = 15 Years)

---

COST/BENEFIT ASSESSMENT:

PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -2,610,459  
A: Parking Revenue = £ -1,458,326  
U: P&R Charges = £ -1,431,546  
  
Total Cost = £ -6,050,081

PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 1,458,326  
O: P&R Charges = £ 1,431,546  
U: HGV VOC Savings = £ 50,255  
U: Car VOC Savings = £ 465,149  
U: Congestion Savings = £ 9,190,908  
U: Accident Savings = £ 906,873  
A: NM Parking Charges = £ 0

Total Benefits = £ 13,503,057

NET PRESENT VALUE (NPV) = £ 7,452,976

---

B/C INDICATORS

Operating B/C Ratio\* = 0.71  
Economic B/C Ratio\*\* = 2.23

IRR INDICATORS

IRR\*\*\* = 11.23

FIRST YEAR INDICATORS

PVC\* = -409679.00  
PVB\* = 267464.49  
Operating B/C Ratio\* = 0.65  
  
PVC\*\* = -409679.00  
PVB\*\* = 581862.53  
Economic B/C Ratio\*\* = 1.42

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---

PREMod Results Site 1: A130 North (Outer)  
26/03/2001 10:14:24

.....  
FILE REFERENCE:

Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site1.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat  
.....

OPTION SELECTION:

Traffic Growth: Low  
With Bus Priority: Yes  
Include Inter-Urban: No  
Parking Charges: No  
User Charges: No  
P&R Market Share: 4%, 6%, 8%, 10%  
.....

BASE PARAMETERS:

Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20  
.....

YEAR 1:

Average Daily Demand = 148  
Annual Demand = 36,945  
Discount Rate = 6.00%  
.....

Spaces in YEAR 15 = 317  
Evaluation P&R Size = 400  
Num Buses Required = 4  
.....

Capital Cost = £ 1,800,000  
(Scheme Life = 15 Years)  
.....

---

COST/BENEFIT ASSESSMENT:

PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -2,829,338  
A: Parking Revenue = £ -615,432  
U: P&R Charges = £ -649,298

Total Cost = £ -4,643,818

PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 615,432  
O: P&R Charges = £ 649,298  
U: HGV VOC Savings = £ -242,757  
U: Car VOC Savings = £ -2,560,975  
U: Congestion Savings = £ -4,589,054  
U: Accident Savings = £ -4,717,175  
A: NM Parking Charges = £ 0

Total Benefits = £ -10,845,231

NET PRESENT VALUE (NPV) = £ -15,489,049  
.....

B/C INDICATORS

Operating B/C Ratio\* = -1.35  
Economic B/C Ratio\*\* = -2.34

IRR INDICATORS

IRR\*\*\* = -999.00

FIRST YEAR INDICATORS

PVC\* = -389166.70  
PVB\* = -712489.53  
Operating B/C Ratio\* = -1.83

PVC\*\* = -389166.70  
PVB\*\* = -1032103.03  
Economic B/C Ratio\*\* = -2.65

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings  
.....

.....  
FILE REFERENCE:

Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site2.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat

.....  
OPTION SELECTION:

Traffic Growth: Low  
With Bus Priority: Yes  
Include Inter-Urban: No  
Parking Charges: No  
User Charges: No  
P&R Market Share: 4%, 6%, 8%, 10%

.....  
BASE PARAMETERS:

Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20

YEAR 1:

Average Daily Demand = 241  
Annual Demand = 60,250  
Discount Rate = 6.00%

Spaces in YEAR 15 = 484  
Evaluation P&R Size = 600  
Num Buses Required = 2

.....  
Capital Cost = £ 2,400,000  
(Scheme Life = 15 Years)

---

COST/BENEFIT ASSESSMENT:

PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -1,134,183  
A: Parking Revenue = £ -1,022,184  
U: P&R Charges = £ -1,017,021

Total Cost = £ -3,723,138

PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 1,022,184  
O: P&R Charges = £ 1,017,021  
U: HGV VOC Savings = £ -236,793  
U: Car VOC Savings = £ -2,496,297  
U: Congestion Savings = £ -4,240,471  
U: Accident Savings = £ -4,599,166  
A: NM Parking Charges = £ 0

Total Benefits = £ -9,533,522

NET PRESENT VALUE (NPV) = £ -13,256,660

---

B/C INDICATORS

Operating B/C Ratio\* = -1.42  
Economic B/C Ratio\*\* = -2.56

IRR INDICATORS

IRR\*\*\* = -999.00

FIRST YEAR INDICATORS

PVC\* = -267748.34  
PVB\* = -635763.21  
Operating B/C Ratio\* = -2.37

PVC\*\* = -267748.34  
PVB\*\* = -949643.46  
Economic B/C Ratio\*\* = -3.55

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---

PREMod Results Site 3: A12 North  
26/03/2001 10:30:01

.....  
FILE REFERENCE:

Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site3.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat  
.....

OPTION SELECTION:

Traffic Growth: Low  
With Bus Priority: Yes  
Include Inter-Urban: No  
Parking Charges: No  
User Charges: No  
P&R Market Share: 4%, 6%, 8%, 10%  
.....

BASE PARAMETERS:

Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20  
.....

YEAR 1:

Average Daily Demand = 213  
Annual Demand = 53,188  
Discount Rate = 6.00%  
.....

Spaces in YEAR 15 = 490  
Evaluation P&R Size = 600  
Num Buses Required = 3  
.....

Capital Cost = £ 2,400,000  
(Scheme Life = 15 Years)

---

COST/BENEFIT ASSESSMENT:

PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -1,956,674  
A: Parking Revenue = £ -869,913  
U: P&R Charges = £ -985,213

Total Cost = £ -4,361,550

PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 869,913  
O: P&R Charges = £ 985,213  
U: HGV VOC Savings = £ -237,262  
U: Car VOC Savings = £ -2,484,648  
U: Congestion Savings = £ -2,839,788  
U: Accident Savings = £ -4,586,488  
A: NM Parking Charges = £ 0

Total Benefits = £ -8,293,061

NET PRESENT VALUE (NPV) = £ -12,654,610

---

B/C INDICATORS

Operating B/C Ratio\* = -1.25  
Economic B/C Ratio\*\* = -1.90

IRR INDICATORS

IRR\*\*\* = -999.00

FIRST YEAR INDICATORS

PVC\* = -342926.94  
PVB\* = -626440.77  
Operating B/C Ratio\* = -1.83

PVC\*\* = -342926.94  
PVB\*\* = -918249.41  
Economic B/C Ratio\*\* = -2.68

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---

PREMod Results Site 4: A1060  
26/03/2001 10:39:10

.....  
FILE REFERENCE:

Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site4.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat

.....  
OPTION SELECTION:

Traffic Growth: Low  
With Bus Priority: Yes  
Include Inter-Urban: No  
Parking Charges: No  
User Charges: No  
P&R Market Share: 4%, 6%, 8%, 10%

.....  
BASE PARAMETERS:

Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20

YEAR 1:

Average Daily Demand = 125  
Annual Demand = 31,153  
Discount Rate = 6.00%

Spaces in YEAR 15 = 281  
Evaluation P&R Size = 400  
Num Buses Required = 1

.....  
Capital Cost = £ 1,800,000  
(Scheme Life = 15 Years)

---

COST/BENEFIT ASSESSMENT:

PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -872,664  
A: Parking Revenue = £ -519,832  
U: P&R Charges = £ -569,296

Total Cost = £ -2,511,542

PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 519,832  
O: P&R Charges = £ 569,296  
U: HGV VOC Savings = £ -258,140  
U: Car VOC Savings = £ -2,667,182  
U: Congestion Savings = £ 4,557,009  
U: Accident Savings = £ -4,946,800  
A: NM Parking Charges = £ 0

Total Benefits = £ -2,225,984

NET PRESENT VALUE (NPV) = £ -4,737,526

---

B/C INDICATORS

Operating B/C Ratio\* = -2.70  
Economic B/C Ratio\*\* = -0.89

IRR INDICATORS

IRR\*\*\* = -999.00

FIRST YEAR INDICATORS

PVC\* = -208411.22  
PVB\* = -692243.55  
Operating B/C Ratio\* = -3.32

PVC\*\* = -208411.22  
PVB\*\* = -558446.19  
Economic B/C Ratio\*\* = -2.68

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---

PREMod Results Site 5: A414 East  
26/03/2001 10:41:49

.....  
FILE REFERENCE:  
Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site5.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat  
.....

OPTION SELECTION:  
Traffic Growth: Low  
With Bus Priority: Yes  
Include Inter-Urban: No  
Parking Charges: No  
User Charges: No  
P&R Market Share: 4%, 6%, 8%, 10%  
.....

BASE PARAMETERS:  
Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20  
.....

YEAR 1:  
Average Daily Demand = 224  
Annual Demand = 56,086  
Discount Rate = 6.00%

Spaces in YEAR 15 = 475  
Evaluation P&R Size = 600  
Num Buses Required = 3  
.....

Capital Cost = £ 2,400,000  
(Scheme Life = 15 Years)

---

#### COST/BENEFIT ASSESSMENT:

##### PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -1,956,674  
A: Parking Revenue = £ -942,584  
U: P&R Charges = £ -994,605

Total Cost = £ -4,443,612

##### PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 942,584  
O: P&R Charges = £ 994,605  
U: HGV VOC Savings = £ -321,345  
U: Car VOC Savings = £ -3,112,099  
U: Congestion Savings = £ -56,593,960  
U: Accident Savings = £ -5,786,129  
A: NM Parking Charges = £ 0

Total Benefits = £ -63,876,344

NET PRESENT VALUE (NPV) = £ -68,319,957

---

#### B/C INDICATORS

Operating B/C Ratio\* = -1.64  
Economic B/C Ratio\*\* = -14.37

#### IRR INDICATORS

IRR\*\*\* = -999.00

#### FIRST YEAR INDICATORS

PVC\* = -349125.13  
PVB\* = -757980.65  
Operating B/C Ratio\* = -2.17

PVC\*\* = -349125.13  
PVB\*\* = -2961480.25  
Economic B/C Ratio\*\* = -8.48

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---

PREMod Results Site 6: A414 West  
26/03/2001 10:42:31

.....  
FILE REFERENCE:

Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site6.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat

.....  
OPTION SELECTION:

Traffic Growth: Low  
With Bus Priority: Yes  
Include Inter-Urban: No  
Parking Charges: No  
User Charges: No  
P&R Market Share: 4%, 6%, 8%, 10%

.....  
BASE PARAMETERS:

Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20

YEAR 1:

Average Daily Demand = 335  
Annual Demand = 83,771  
Discount Rate = 6.00%

Spaces in YEAR 15 = 632  
Evaluation P&R Size = 800  
Num Buses Required = 2

.....  
Capital Cost = £ 3,000,000  
(Scheme Life = 15 Years)

---

COST/BENEFIT ASSESSMENT:

PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -1,084,010  
A: Parking Revenue = £ -1,450,168  
U: P&R Charges = £ -1,352,189

Total Cost = £ -4,436,117

PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 1,450,168  
O: P&R Charges = £ 1,352,189  
U: HGV VOC Savings = £ -288,325  
U: Car VOC Savings = £ -2,938,338  
U: Congestion Savings = £ 684,485  
U: Accident Savings = £ -5,443,068  
A: NM Parking Charges = £ 0

Total Benefits = £ -5,182,889

NET PRESENT VALUE (NPV) = £ -9,619,005

---

B/C INDICATORS

Operating B/C Ratio\* = -1.32  
Economic B/C Ratio\*\* = -1.17

IRR INDICATORS

IRR\*\*\* = -999.00

FIRST YEAR INDICATORS

PVC\* = -319954.30  
PVB\* = -688746.17  
Operating B/C Ratio\* = -2.15

PVC\*\* = -319954.30  
PVB\*\* = -497453.21  
Economic B/C Ratio\*\* = -1.55

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---

PREMod Results Site 7: A12 South  
26/03/2001 10:44:04

.....  
FILE REFERENCE:

Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site7.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat

.....  
OPTION SELECTION:

Traffic Growth: Low  
With Bus Priority: Yes  
Include Inter-Urban: No  
Parking Charges: No  
User Charges: No  
P&R Market Share: 4%, 6%, 8%, 10%

.....  
BASE PARAMETERS:

Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20

YEAR 1:

Average Daily Demand = 84  
Annual Demand = 20,898  
Discount Rate = 6.00%

Spaces in YEAR 15 = 135  
Evaluation P&R Size = 200  
Num Buses Required = 3

.....  
Capital Cost = £ 1,200,000  
(Scheme Life = 15 Years)

---

COST/BENEFIT ASSESSMENT:

PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -1,822,561  
A: Parking Revenue = £ -382,994  
U: P&R Charges = £ -278,875

Total Cost = £ -3,034,180

PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 382,994  
O: P&R Charges = £ 278,875  
U: HGV VOC Savings = £ -313,816  
U: Car VOC Savings = £ -3,169,011  
U: Congestion Savings = £ -3,178,891  
U: Accident Savings = £ -5,894,920  
A: NM Parking Charges = £ 0

Total Benefits = £ -11,894,770

NET PRESENT VALUE (NPV) = £ -14,928,950

---

B/C INDICATORS

Operating B/C Ratio\* = -2.87  
Economic B/C Ratio\*\* = -3.92

IRR INDICATORS

IRR\*\*\* = -999.00

FIRST YEAR INDICATORS

PVC\* = -264068.48  
PVB\* = -849413.44  
Operating B/C Ratio\* = -3.22

PVC\*\* = -264068.48  
PVB\*\* = -867404.94  
Economic B/C Ratio\*\* = -3.28

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---



PREMod Results Site 8: A130 South  
26/03/2001 10:45:52

.....  
FILE REFERENCE:

Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site8.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat

.....  
OPTION SELECTION:

Traffic Growth: Low  
With Bus Priority: Yes  
Include Inter-Urban: No  
Parking Charges: No  
User Charges: No  
P&R Market Share: 4%, 6%, 8%, 10%

.....  
BASE PARAMETERS:

Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20

YEAR 1:

Average Daily Demand = 340  
Annual Demand = 85,034  
Discount Rate = 6.00%

Spaces in YEAR 15 = 681  
Evaluation P&R Size = 800  
Num Buses Required = 3

.....  
Capital Cost = £ 3,000,000  
(Scheme Life = 15 Years)

---

COST/BENEFIT ASSESSMENT:

PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -1,956,674  
A: Parking Revenue = £ -1,458,326  
U: P&R Charges = £ -1,431,546

Total Cost = £ -5,396,295

PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 1,458,326  
O: P&R Charges = £ 1,431,546  
U: HGV VOC Savings = £ -307,348  
U: Car VOC Savings = £ -2,973,364  
U: Congestion Savings = £ -49,328,752  
U: Accident Savings = £ -5,504,844  
A: NM Parking Charges = £ 0

Total Benefits = £ -55,224,436

NET PRESENT VALUE (NPV) = £ -60,620,732

---

B/C INDICATORS

Operating B/C Ratio\* = -1.09  
Economic B/C Ratio\*\* = -10.23

IRR INDICATORS

IRR\*\*\* = -999.00

FIRST YEAR INDICATORS

PVC\* = -409679.00  
PVB\* = -664509.97  
Operating B/C Ratio\* = -1.62

PVC\*\* = -409679.00  
PVB\*\* = -2938269.69  
Economic B/C Ratio\*\* = -7.17

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---

PREMod Results Site 1: A130 North (Outer)  
26/03/2001 12:55:38

.....  
FILE REFERENCE:

Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site1.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat  
.....

OPTION SELECTION:

Traffic Growth: Low  
With Bus Priority: Yes  
Include Inter-Urban: No  
Parking Charges: Yes  
User Charges: No  
P&R Market Share: 4%, 6%, 8%, 30%  
.....

BASE PARAMETERS:

Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20  
.....

YEAR 1:

Average Daily Demand = 148  
Annual Demand = 36,945  
Discount Rate = 6.00%  
.....

Spaces in YEAR 15 = 977  
Evaluation P&R Size = 1200  
Num Buses Required = 4  
.....

Capital Cost = £ 5,000,000  
(Scheme Life = 15 Years)

---

COST/BENEFIT ASSESSMENT:

PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -2,829,338  
A: Parking Revenue = £ -862,320  
U: P&R Charges = £ -931,174

Total Cost = £ -5,172,582

PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 862,320  
O: P&R Charges = £ 931,174  
U: HGV VOC Savings = £ -207,194  
U: Car VOC Savings = £ -2,231,479  
U: Congestion Savings = £ -2,457,492  
U: Accident Savings = £ -3,993,717  
A: NM Parking Charges = £ 9,892,241

Total Benefits = £ 2,795,853

NET PRESENT VALUE (NPV) = £ -2,376,729

---

B/C INDICATORS

Operating B/C Ratio\* = 1.02  
Economic B/C Ratio\*\* = 0.54

IRR INDICATORS

IRR\*\*\* = -999.00

FIRST YEAR INDICATORS

PVC\* = -389166.70  
PVB\* = -712489.53  
Operating B/C Ratio\* = -1.83

PVC\*\* = -389166.70  
PVB\*\* = -1032103.03  
Economic B/C Ratio\*\* = -2.65

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---

PREMod Results Site 2: A130 North (Inner)  
26/03/2001 12:55:54

.....  
FILE REFERENCE:

Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site2.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat  
.....

OPTION SELECTION:

Traffic Growth: Low  
With Bus Priority: Yes  
Include Inter-Urban: No  
Parking Charges: Yes  
User Charges: No  
P&R Market Share: 4%, 6%, 8%, 30%  
.....

BASE PARAMETERS:

Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20  
.....

YEAR 1:

Average Daily Demand = 241  
Annual Demand = 60,250  
Discount Rate = 6.00%  
.....

Spaces in YEAR 15 = 1588  
Evaluation P&R Size = 2000  
Num Buses Required = 2  
.....

Capital Cost = £ 8,000,000  
(Scheme Life = 15 Years)  
.....

---

COST/BENEFIT ASSESSMENT:

PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -1,134,183  
A: Parking Revenue = £ -1,494,001  
U: P&R Charges = £ -1,502,155  
  
Total Cost = £ -4,680,089

PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 1,494,001  
O: P&R Charges = £ 1,502,155  
U: HGV VOC Savings = £ -192,911  
U: Car VOC Savings = £ -2,084,584  
U: Congestion Savings = £ -2,495,381  
U: Accident Savings = £ -3,688,455  
A: NM Parking Charges = £ 9,753,216

Total Benefits = £ 4,288,041

NET PRESENT VALUE (NPV) = £ -392,048  
.....

B/C INDICATORS

Operating B/C Ratio\* = 1.45  
Economic B/C Ratio\*\* = 0.92

IRR INDICATORS

IRR\*\*\* = -999.00

FIRST YEAR INDICATORS

PVC\* = -267748.34  
PVB\* = -635763.21  
Operating B/C Ratio\* = -2.37  
  
PVC\*\* = -267748.34  
PVB\*\* = -949643.46  
Economic B/C Ratio\*\* = -3.55

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---

PREMod Results Site 3: A12 North  
26/03/2001 12:56:05

.....  
FILE REFERENCE:  
Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site3.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat  
.....

OPTION SELECTION:  
Traffic Growth: Low  
With Bus Priority: Yes  
Include Inter-Urban: No  
Parking Charges: Yes  
User Charges: No  
P&R Market Share: 4%, 6%, 8%, 30%  
.....

BASE PARAMETERS:  
Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20  
.....

YEAR 1:  
Average Daily Demand = 213  
Annual Demand = 53,188  
Discount Rate = 6.00%

Spaces in YEAR 15 = 1558  
Evaluation P&R Size = 2000  
Num Buses Required = 3  
.....

Capital Cost = £ 8,000,000  
(Scheme Life = 15 Years)

---

#### COST/BENEFIT ASSESSMENT:

##### PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -1,956,674  
A: Parking Revenue = £ -1,075,591  
U: P&R Charges = £ -1,427,895

Total Cost = £ -5,009,910

##### PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 1,075,591  
O: P&R Charges = £ 1,427,895  
U: HGV VOC Savings = £ -207,800  
U: Car VOC Savings = £ -2,213,479  
U: Congestion Savings = £ -626,822  
U: Accident Savings = £ -3,991,587  
A: NM Parking Charges = £ 9,861,926

Total Benefits = £ 5,325,725

NET PRESENT VALUE (NPV) = £ 315,815

---

#### B/C INDICATORS

Operating B/C Ratio\* = 1.19  
Economic B/C Ratio\*\* = 1.06

#### IRR INDICATORS

IRR\*\*\* = -999.00

#### FIRST YEAR INDICATORS

PVC\* = -342926.94  
PVB\* = -626440.77  
Operating B/C Ratio\* = -1.83

PVC\*\* = -342926.94  
PVB\*\* = -918249.41  
Economic B/C Ratio\*\* = -2.68

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---

26/03/2001 12:56:14

## FILE REFERENCE:

Parameter File: C:\P&RModel\Data\HighMS.par  
 Site File: C:\P&RModel\Data\Site4.def  
 COBA File: C:\P&RModel\Data\Coba.def  
 Do-Nothing File: C:\P&RModel\Data\DN.dat

## OPTION SELECTION:

Traffic Growth: Low  
 With Bus Priority: Yes  
 Include Inter-Urban: No  
 Parking Charges: Yes  
 User Charges: No  
 P&R Market Share: 4%, 6%, 8%, 30%

## BASE PARAMETERS:

Fare Levels (pence) = 80  
 Peak Headway (min) = 10  
 Off-Peak Headway (min) = 20

## YEAR 1:

Average Daily Demand = 125  
 Annual Demand = 31,153  
 Discount Rate = 6.00%

Spaces in YEAR 15 = 885  
 Evaluation P&R Size = 1200  
 Num Buses Required = 1

Capital Cost = £ 5,000,000  
 (Scheme Life = 15 Years)

## COST/BENEFIT ASSESSMENT:

## PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
 O: Bus Operating Cost = £ -872,664  
 A: Parking Revenue = £ -938,978  
 U: P&R Charges = £ -825,490

Total Cost = £ -3,186,883

## PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 938,978  
 O: P&R Charges = £ 825,490  
 U: HGV VOC Savings = £ -231,124  
 U: Car VOC Savings = £ -2,409,037  
 U: Congestion Savings = £ 5,265,818  
 U: Accident Savings = £ -4,379,551  
 A: NM Parking Charges = £ 9,867,392

Total Benefits = £ 9,877,967

NET PRESENT VALUE (NPV) = £ 6,691,084

## B/C INDICATORS

Operating B/C Ratio\* = 1.45  
 Economic B/C Ratio\*\* = 3.10

## IRR INDICATORS

IRR\*\*\* = 5.44

## FIRST YEAR INDICATORS

PVC\* = -208411.22  
 PVB\* = -692243.55  
 Operating B/C Ratio\* = -3.32

PVC\*\* = -208411.22  
 PVB\*\* = -558446.19  
 Economic B/C Ratio\*\* = -2.68

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

PREMod Results Site 5: A414 East  
26/03/2001 12:56:27

.....  
FILE REFERENCE:

Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site5.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat  
.....

OPTION SELECTION:

Traffic Growth: Low  
With Bus Priority: Yes  
Include Inter-Urban: No  
Parking Charges: Yes  
User Charges: No  
P&R Market Share: 4%, 6%, 8%, 30%  
.....

BASE PARAMETERS:

Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20  
.....

YEAR 1:

Average Daily Demand = 224  
Annual Demand = 56,086  
Discount Rate = 6.00%

Spaces in YEAR 15 = 1494  
Evaluation P&R Size = 2000  
Num Buses Required = 3  
.....

Capital Cost = £ 8,000,000  
(Scheme Life = 15 Years)

---

COST/BENEFIT ASSESSMENT:

PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -1,956,674  
A: Parking Revenue = £ -1,186,612  
U: P&R Charges = £ -1,438,407

Total Cost = £ -5,131,443

PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 1,186,612  
O: P&R Charges = £ 1,438,407  
U: HGV VOC Savings = £ -286,702  
U: Car VOC Savings = £ -2,802,560  
U: Congestion Savings = £ -46,933,873  
U: Accident Savings = £ -5,108,991  
A: NM Parking Charges = £ 9,868,674

Total Benefits = £ -42,638,433

NET PRESENT VALUE (NPV) = £ -47,769,876

---

B/C INDICATORS

Operating B/C Ratio\* = 0.84  
Economic B/C Ratio\*\* = -8.31

IRR INDICATORS

IRR\*\*\* = -999.00

FIRST YEAR INDICATORS

PVC\* = -349125.13  
PVB\* = -757980.65  
Operating B/C Ratio\* = -2.17  
  
PVC\*\* = -349125.13  
PVB\*\* = -2961480.25  
Economic B/C Ratio\*\* = -8.48

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---

PREMod Results Site 6: A414 West  
26/03/2001 12:56:36

.....  
FILE REFERENCE:

Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site6.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat  
.....

OPTION SELECTION:

Traffic Growth: Low  
With Bus Priority: Yes  
Include Inter-Urban: No  
Parking Charges: Yes  
User Charges: No  
P&R Market Share: 4%, 6%, 8%, 30%  
.....

BASE PARAMETERS:

Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20  
.....

YEAR 1:

Average Daily Demand = 335  
Annual Demand = 83,771  
Discount Rate = 6.00%  
.....

Spaces in YEAR 15 = 1988  
Evaluation P&R Size = 2000  
Num Buses Required = 2  
.....

Capital Cost = £ 8,000,000  
(Scheme Life = 15 Years)

---

COST/BENEFIT ASSESSMENT:

PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -1,084,010  
A: Parking Revenue = £ -2,048,273  
U: P&R Charges = £ -1,919,810  
  
Total Cost = £ -5,601,843

PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 2,048,273  
O: P&R Charges = £ 1,919,810  
U: HGV VOC Savings = £ -242,297  
U: Car VOC Savings = £ -2,512,926  
U: Congestion Savings = £ 1,686,524  
U: Accident Savings = £ -4,504,963  
A: NM Parking Charges = £ 9,660,323

Total Benefits = £ 8,054,743

NET PRESENT VALUE (NPV) = £ 2,452,900

---

B/C INDICATORS

Operating B/C Ratio\* = 1.14  
Economic B/C Ratio\*\* = 1.44

IRR INDICATORS

IRR\*\*\* = -999.00

FIRST YEAR INDICATORS

PVC\* = -319954.30  
PVB\* = -688746.17  
Operating B/C Ratio\* = -2.15

PVC\*\* = -319954.30  
PVB\*\* = -497453.21  
Economic B/C Ratio\*\* = -1.55

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---

.....  
FILE REFERENCE:

Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site7.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat

.....  
OPTION SELECTION:

Traffic Growth: Low  
With Bus Priority: Yes  
Include Inter-Urban: No  
Parking Charges: Yes  
User Charges: No  
P&R Market Share: 4%, 6%, 8%, 30%

.....  
BASE PARAMETERS:

Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20

YEAR 1:

Average Daily Demand = 84  
Annual Demand = 20,898  
Discount Rate = 6.00%

Spaces in YEAR 15 = 422  
Evaluation P&R Size = 600  
Num Buses Required = 3

.....  
Capital Cost = £ 2,400,000  
(Scheme Life = 15 Years)

---

COST/BENEFIT ASSESSMENT:

PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -1,864,687  
A: Parking Revenue = £ -805,269  
U: P&R Charges = £ -402,329

Total Cost = £ -3,622,036

PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 805,269  
O: P&R Charges = £ 402,329  
U: HGV VOC Savings = £ -273,120  
U: Car VOC Savings = £ -2,789,381  
U: Congestion Savings = £ -4,375,893  
U: Accident Savings = £ -5,060,936  
A: NM Parking Charges = £ 9,908,055

Total Benefits = £ -1,383,677

NET PRESENT VALUE (NPV) = £ -5,005,713

---

B/C INDICATORS

Operating B/C Ratio\* = 0.83  
Economic B/C Ratio\*\* = -0.38

IRR INDICATORS

IRR\*\*\* = -999.00

FIRST YEAR INDICATORS

PVC\* = -264068.48  
PVB\* = -849413.44  
Operating B/C Ratio\* = -3.22

PVC\*\* = -264068.48  
PVB\*\* = -867404.94  
Economic B/C Ratio\*\* = -3.28

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---



PREMod Results Site 8: A130 South  
26/03/2001 12:56:53

.....  
FILE REFERENCE:

Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site8.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat

.....  
OPTION SELECTION:

Traffic Growth: Low  
With Bus Priority: Yes  
Include Inter-Urban: No  
Parking Charges: Yes  
User Charges: No  
P&R Market Share: 4%, 6%, 8%, 30%

.....  
BASE PARAMETERS:

Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20

YEAR 1:

Average Daily Demand = 340  
Annual Demand = 85,034  
Discount Rate = 6.00%

Spaces in YEAR 15 = 2089  
Evaluation P&R Size = 3000  
Num Buses Required = 3

.....  
Capital Cost = £ 10,000,000  
(Scheme Life = 15 Years)

---

COST/BENEFIT ASSESSMENT:

PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -1,956,674  
A: Parking Revenue = £ -1,681,172  
U: P&R Charges = £ -2,044,756

Total Cost = £ -6,232,352

PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 1,681,172  
O: P&R Charges = £ 2,044,756  
U: HGV VOC Savings = £ -274,716  
U: Car VOC Savings = £ -2,679,593  
U: Congestion Savings = £ -44,725,884  
U: Accident Savings = £ -4,860,816  
A: NM Parking Charges = £ 9,806,732

Total Benefits = £ -39,008,348

NET PRESENT VALUE (NPV) = £ -45,240,701

---

B/C INDICATORS

Operating B/C Ratio\* = 0.92  
Economic B/C Ratio\*\* = -6.26

IRR INDICATORS

IRR\*\*\* = -999.00

FIRST YEAR INDICATORS

PVC\* = -409679.00  
PVB\* = -664509.97  
Operating B/C Ratio\* = -1.62

PVC\*\* = -409679.00  
PVB\*\* = -2938269.69  
Economic B/C Ratio\*\* = -7.17

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---

PREMod Results Site 1: A130 North (Outer)  
26/03/2001 12:58:09

.....  
FILE REFERENCE:  
Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site1.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat  
.....

OPTION SELECTION:  
Traffic Growth: Low  
With Bus Priority: Yes  
Include Inter-Urban: No  
Parking Charges: Yes  
User Charges: No  
P&R Market Share: 4%, 6%, 20%, 40%

.....  
BASE PARAMETERS:  
Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20

YEAR 1:  
Average Daily Demand = 148  
Annual Demand = 36,945  
Discount Rate = 6.00%

Spaces in YEAR 15 = 1308  
Evaluation P&R Size = 2000  
Num Buses Required = 4

.....  
Capital Cost = £ 8,000,000  
(Scheme Life = 15 Years)

---

COST/BENEFIT ASSESSMENT:

PRESENT VALUE COSTS (PVC)  
A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -2,829,338  
A: Parking Revenue = £ -1,276,234  
U: P&R Charges = £ -1,403,375  
  
Total Cost = £ -6,058,697

PRESENT VALUE BENEFITS (PVB)  
U: Parking Charges = £ 1,276,234  
O: P&R Charges = £ 1,403,375  
U: HGV VOC Savings = £ -139,579  
U: Car VOC Savings = £ -1,589,022  
U: Congestion Savings = £ 786,319  
U: Accident Savings = £ -2,681,414  
A: NM Parking Charges = £ 28,693,204  
  
Total Benefits = £ 27,749,117

NET PRESENT VALUE (NPV) = £ 21,690,420

---

B/C INDICATORS  
Operating B/C Ratio\* = 4.45  
Economic B/C Ratio\*\* = 4.58

IRR INDICATORS  
IRR\*\*\* = 11.29

FIRST YEAR INDICATORS  
PVC\* = -389166.70  
PVB\* = -712489.53  
Operating B/C Ratio\* = -1.83  
  
PVC\*\* = -389166.70  
PVB\*\* = -1032103.03  
Economic B/C Ratio\*\* = -2.65

\* Excludes Congestion Savings  
\*\* Includes Congestion Savings  
\*\*\* Includes Capital Cost & Congestion Savings

---

PREMod Results Site 2: A130 North (Inner)  
26/03/2001 12:58:17

.....  
FILE REFERENCE:  
Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site2.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat  
.....

OPTION SELECTION:  
Traffic Growth: Low  
With Bus Priority: Yes  
Include Inter-Urban: No  
Parking Charges: Yes  
User Charges: No  
P&R Market Share: 4%, 6%, 20%, 40%  
.....

BASE PARAMETERS:  
Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20  
.....

YEAR 1:  
Average Daily Demand = 241  
Annual Demand = 60,250  
Discount Rate = 6.00%

Spaces in YEAR 15 = 2139  
Evaluation P&R Size = 3000  
Num Buses Required = 2  
.....

Capital Cost = £ 10,000,000  
(Scheme Life = 15 Years)

---

COST/BENEFIT ASSESSMENT:

PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -1,134,183  
A: Parking Revenue = £ -2,283,520  
U: P&R Charges = £ -2,312,968

Total Cost = £ -6,280,420

PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 2,283,520  
O: P&R Charges = £ 2,312,968  
U: HGV VOC Savings = £ -116,775  
U: Car VOC Savings = £ -1,355,714  
U: Congestion Savings = £ 594,329  
U: Accident Savings = £ -2,186,680  
A: NM Parking Charges = £ 28,214,964

Total Benefits = £ 29,746,611

NET PRESENT VALUE (NPV) = £ 23,466,191

---

B/C INDICATORS

Operating B/C Ratio\* = 4.64  
Economic B/C Ratio\*\* = 4.74

IRR INDICATORS

IRR\*\*\* = 10.34

FIRST YEAR INDICATORS

PVC\* = -267748.34  
PVB\* = -635763.21  
Operating B/C Ratio\* = -2.37

PVC\*\* = -267748.34  
PVB\*\* = -949643.46  
Economic B/C Ratio\*\* = -3.55

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---

.....

FILE REFERENCE:

Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site3.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat

.....

OPTION SELECTION:

Traffic Growth: Low  
With Bus Priority: Yes  
Include Inter-Urban: No  
Parking Charges: Yes  
User Charges: No  
P&R Market Share: 4%, 6%, 20%, 40%

.....

BASE PARAMETERS:

Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20

YEAR 1:

Average Daily Demand = 213  
Annual Demand = 53,188  
Discount Rate = 6.00%

Spaces in YEAR 15 = 2092  
Evaluation P&R Size = 3000  
Num Buses Required = 3

.....

Capital Cost = £ 10,000,000  
(Scheme Life = 15 Years)

---

COST/BENEFIT ASSESSMENT:

PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -1,956,674  
A: Parking Revenue = £ -1,421,432  
U: P&R Charges = £ -2,168,996  
  
Total Cost = £ -6,096,853

PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 1,421,432  
O: P&R Charges = £ 2,168,996  
U: HGV VOC Savings = £ -150,783  
U: Car VOC Savings = £ -1,673,053  
U: Congestion Savings = £ 2,705,621  
U: Accident Savings = £ -2,890,379  
A: NM Parking Charges = £ 28,636,027

Total Benefits = £ 30,217,861

NET PRESENT VALUE (NPV) = £ 24,121,009

---

B/C INDICATORS

Operating B/C Ratio\* = 4.51  
Economic B/C Ratio\*\* = 4.96

IRR INDICATORS

IRR\*\*\* = 10.25

FIRST YEAR INDICATORS

PVC\* = -342926.94  
PVB\* = -626440.77  
Operating B/C Ratio\* = -1.83

PVC\*\* = -342926.94  
PVB\*\* = -918249.41  
Economic B/C Ratio\*\* = -2.68

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---

PREMod Results Site 4: A1060  
26/03/2001 12:58:35

.....  
FILE REFERENCE:

Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site4.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat

.....  
OPTION SELECTION:

Traffic Growth: Low  
With Bus Priority: Yes  
Include Inter-Urban: No  
Parking Charges: Yes  
User Charges: No  
P&R Market Share: 4%, 6%, 20%, 40%

.....  
BASE PARAMETERS:

Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20

YEAR 1:

Average Daily Demand = 125  
Annual Demand = 31,153  
Discount Rate = 6.00%

Spaces in YEAR 15 = 1186  
Evaluation P&R Size = 1200  
Num Buses Required = 1

.....  
Capital Cost = £ 5,000,000  
(Scheme Life = 15 Years)

---

COST/BENEFIT ASSESSMENT:

PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -872,664  
A: Parking Revenue = £ -1,637,770  
U: P&R Charges = £ -1,255,458

Total Cost = £ -4,315,642

PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 1,637,770  
O: P&R Charges = £ 1,255,458  
U: HGV VOC Savings = £ -180,965  
U: Car VOC Savings = £ -1,912,582  
U: Congestion Savings = £ 5,479,630  
U: Accident Savings = £ -3,364,307  
A: NM Parking Charges = £ 28,578,899

Total Benefits = £ 31,493,904

NET PRESENT VALUE (NPV) = £ 27,178,262

---

B/C INDICATORS

Operating B/C Ratio\* = 6.03  
Economic B/C Ratio\*\* = 7.30

IRR INDICATORS

IRR\*\*\* = 19.67

FIRST YEAR INDICATORS

PVC\* = -208411.22  
PVB\* = -692243.55  
Operating B/C Ratio\* = -3.32

PVC\*\* = -208411.22  
PVB\*\* = -558446.19  
Economic B/C Ratio\*\* = -2.68

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---

PREMod Results Site 5: A414 East  
26/03/2001 12:58:50

.....  
FILE REFERENCE:  
Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site5.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat  
.....

OPTION SELECTION:  
Traffic Growth: Low  
With Bus Priority: Yes  
Include Inter-Urban: No  
Parking Charges: Yes  
User Charges: No  
P&R Market Share: 4%, 6%, 20%, 40%

.....  
BASE PARAMETERS:  
Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20

YEAR 1:  
Average Daily Demand = 224  
Annual Demand = 56,086  
Discount Rate = 6.00%

Spaces in YEAR 15 = 2004  
Evaluation P&R Size = 3000  
Num Buses Required = 3

.....  
Capital Cost = £ 10,000,000  
(Scheme Life = 15 Years)

---

#### COST/BENEFIT ASSESSMENT:

##### PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -1,864,687  
A: Parking Revenue = £ -1,595,303  
U: P&R Charges = £ -2,182,846  
  
Total Cost = £ -6,192,587

##### PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 1,595,303  
O: P&R Charges = £ 2,182,846  
U: HGV VOC Savings = £ -222,465  
U: Car VOC Savings = £ -2,207,968  
U: Congestion Savings = £ -33,447,062  
U: Accident Savings = £ -3,895,732  
A: NM Parking Charges = £ 28,655,931

Total Benefits = £ -7,339,145

NET PRESENT VALUE (NPV) = £ -13,531,732

---

##### B/C INDICATORS

Operating B/C Ratio\* = 4.22  
Economic B/C Ratio\*\* = 1.19

##### IRR INDICATORS

IRR\*\*\* = -999.00

##### FIRST YEAR INDICATORS

PVC\* = -349125.13  
PVB\* = -757980.65  
Operating B/C Ratio\* = -2.17

PVC\*\* = -349125.13  
PVB\*\* = -2961480.25  
Economic B/C Ratio\*\* = -8.48

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---

.....  
FILE REFERENCE:

Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site6.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat  
.....

OPTION SELECTION:

Traffic Growth: Low  
With Bus Priority: Yes  
Include Inter-Urban: No  
Parking Charges: Yes  
User Charges: No  
P&R Market Share: 4%, 6%, 20%, 40%  
.....

BASE PARAMETERS:

Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20  
.....

YEAR 1:

Average Daily Demand = 335  
Annual Demand = 83,771  
Discount Rate = 6.00%  
.....

Spaces in YEAR 15 = 2667  
Evaluation P&R Size = 3000  
Num Buses Required = 2  
.....

Capital Cost = £ 10,000,000  
(Scheme Life = 15 Years)

---

COST/BENEFIT ASSESSMENT:

PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -1,084,010  
A: Parking Revenue = £ -3,048,248  
U: P&R Charges = £ -2,787,503

Total Cost = £ -7,469,510

PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 3,048,248  
O: P&R Charges = £ 2,787,503  
U: HGV VOC Savings = £ -158,790  
U: Car VOC Savings = £ -1,716,847  
U: Congestion Savings = £ 4,108,300  
U: Accident Savings = £ -2,869,206  
A: NM Parking Charges = £ 27,913,014

Total Benefits = £ 33,112,221

NET PRESENT VALUE (NPV) = £ 25,642,711

---

B/C INDICATORS

Operating B/C Ratio\* = 3.88  
Economic B/C Ratio\*\* = 4.43

IRR INDICATORS

IRR\*\*\* = 11.26

FIRST YEAR INDICATORS

PVC\* = -319954.30  
PVB\* = -688746.17  
Operating B/C Ratio\* = -2.15

PVC\*\* = -319954.30  
PVB\*\* = -497453.21  
Economic B/C Ratio\*\* = -1.55

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---

FILE REFERENCE:

Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site7.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat

OPTION SELECTION:

Traffic Growth: Low  
With Bus Priority: Yes  
Include Inter-Urban: No  
Parking Charges: Yes  
User Charges: No  
P&R Market Share: 4%, 6%, 20%, 40%

BASE PARAMETERS:

Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20

YEAR 1:

Average Daily Demand = 84  
Annual Demand = 20,898  
Discount Rate = 6.00%

Spaces in YEAR 15 = 566  
Evaluation P&R Size = 600  
Num Buses Required = 3

Capital Cost = £ 2,400,000  
(Scheme Life = 15 Years)

---

COST/BENEFIT ASSESSMENT:

PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -1,864,687  
A: Parking Revenue = £ -1,508,105  
U: P&R Charges = £ -609,590

Total Cost = £ -4,532,132

PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 1,508,105  
O: P&R Charges = £ 609,590  
U: HGV VOC Savings = £ -199,131  
U: Car VOC Savings = £ -2,074,971  
U: Congestion Savings = £ -8,379,348  
U: Accident Savings = £ -3,596,938  
A: NM Parking Charges = £ 28,699,624

Total Benefits = £ 16,566,931

NET PRESENT VALUE (NPV) = £ 12,034,799

---

B/C INDICATORS

Operating B/C Ratio\* = 5.50  
Economic B/C Ratio\*\* = 3.66

IRR INDICATORS

IRR\*\*\* = 16.12

FIRST YEAR INDICATORS

PVC\* = -264068.48  
PVB\* = -849413.44  
Operating B/C Ratio\* = -3.22

PVC\*\* = -264068.48  
PVB\*\* = -867404.94  
Economic B/C Ratio\*\* = -3.28

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---



PREMod Results Site 8: A130 South  
26/03/2001 12:59:15

.....  
FILE REFERENCE:

Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site8.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat  
.....

OPTION SELECTION:

Traffic Growth: Low  
With Bus Priority: Yes  
Include Inter-Urban: No  
Parking Charges: Yes  
User Charges: No  
P&R Market Share: 4%, 6%, 20%, 40%  
.....

BASE PARAMETERS:

Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20  
.....

YEAR 1:

Average Daily Demand = 340  
Annual Demand = 85,034  
Discount Rate = 6.00%  
.....

Spaces in YEAR 15 = 2793  
Evaluation P&R Size = 3000  
Num Buses Required = 3  
.....

Capital Cost = £ 10,000,000  
(Scheme Life = 15 Years)

---

COST/BENEFIT ASSESSMENT:

PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -1,909,341  
A: Parking Revenue = £ -2,055,199  
U: P&R Charges = £ -3,072,267  
  
Total Cost = £ -7,586,557

PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 2,055,199  
O: P&R Charges = £ 3,072,267  
U: HGV VOC Savings = £ -212,231  
U: Car VOC Savings = £ -2,100,331  
U: Congestion Savings = £ -39,174,974  
U: Accident Savings = £ -3,679,365  
A: NM Parking Charges = £ 28,501,973

Total Benefits = £ -11,537,463

NET PRESENT VALUE (NPV) = £ -19,124,020

---

B/C INDICATORS

Operating B/C Ratio\* = 3.64  
Economic B/C Ratio\*\* = 1.52

IRR INDICATORS

IRR\*\*\* = -999.00

FIRST YEAR INDICATORS

PVC\* = -409679.00  
PVB\* = -664509.97  
Operating B/C Ratio\* = -1.62

PVC\*\* = -409679.00  
PVB\*\* = -2938269.69  
Economic B/C Ratio\*\* = -7.17

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---

PREMod Results Site 1: A130 North (Outer)  
26/03/2001 13:00:36

.....  
FILE REFERENCE:  
Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site1.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat  
.....

OPTION SELECTION:  
Traffic Growth: Low  
With Bus Priority: Yes  
Include Inter-Urban: No  
Parking Charges: Yes  
User Charges: No  
P&R Market Share: 4%, 10%, 30%, 45%

.....  
BASE PARAMETERS:  
Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20

YEAR 1:  
Average Daily Demand = 168  
Annual Demand = 41,886  
Discount Rate = 6.00%

Spaces in YEAR 15 = 1473  
Evaluation P&R Size = 2000  
Num Buses Required = 4

.....  
Capital Cost = £ 8,000,000  
(Scheme Life = 15 Years)

---

#### COST/BENEFIT ASSESSMENT:

##### PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -2,829,338  
A: Parking Revenue = £ -1,696,317  
U: P&R Charges = £ -1,883,974

Total Cost = £ -6,959,379

##### PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 1,696,317  
O: P&R Charges = £ 1,883,974  
U: HGV VOC Savings = £ -60,067  
U: Car VOC Savings = £ -815,012  
U: Congestion Savings = £ 3,888,760  
U: Accident Savings = £ -1,197,844  
A: NM Parking Charges = £ 51,621,611

Total Benefits = £ 57,017,738

NET PRESENT VALUE (NPV) = £ 50,058,359

---

#### B/C INDICATORS

Operating B/C Ratio\* = 7.63  
Economic B/C Ratio\*\* = 8.19

#### IRR INDICATORS

IRR\*\*\* = -999.00

#### FIRST YEAR INDICATORS

PVC\* = -400586.21  
PVB\* = 893604.93  
Operating B/C Ratio\* = 2.23

PVC\*\* = -400586.21  
PVB\*\* = 612663.30  
Economic B/C Ratio\*\* = 1.53

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---

PREMod Results Site 2: A130 North (Inner)  
26/03/2001 13:00:45

.....  
FILE REFERENCE:

Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site2.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat

.....  
OPTION SELECTION:

Traffic Growth: Low  
With Bus Priority: Yes  
Include Inter-Urban: No  
Parking Charges: Yes  
User Charges: No  
P&R Market Share: 4%, 10%, 30%, 45%

.....  
BASE PARAMETERS:

Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20

YEAR 1:

Average Daily Demand = 278  
Annual Demand = 69,590  
Discount Rate = 6.00%

Spaces in YEAR 15 = 2415  
Evaluation P&R Size = 3000  
Num Buses Required = 2

.....

Capital Cost = £ 10,000,000

(Scheme Life = 15 Years)

---

COST/BENEFIT ASSESSMENT:

PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -1,134,183  
A: Parking Revenue = £ -3,085,356  
U: P&R Charges = £ -3,116,474  
  
Total Cost = £ -7,885,762

PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 3,085,356  
O: P&R Charges = £ 3,116,474  
U: HGV VOC Savings = £ -29,437  
U: Car VOC Savings = £ -506,108  
U: Congestion Savings = £ 3,829,761  
U: Accident Savings = £ -547,687  
A: NM Parking Charges = £ 50,681,851

Total Benefits = £ 59,630,210

NET PRESENT VALUE (NPV) = £ 51,744,448

---

B/C INDICATORS

Operating B/C Ratio\* = 7.08  
Economic B/C Ratio\*\* = 7.56

IRR INDICATORS

IRR\*\*\* = -999.00

FIRST YEAR INDICATORS

PVC\* = -282007.00  
PVB\* = 969289.66  
Operating B/C Ratio\* = 3.44

PVC\*\* = -282007.00  
PVB\*\* = 696863.53  
Economic B/C Ratio\*\* = 2.47

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---

PREMod Results Site 3: A12 North  
26/03/2001 13:00:53

.....  
FILE REFERENCE:  
Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site3.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat

.....  
OPTION SELECTION:  
Traffic Growth: Low  
With Bus Priority: Yes  
Include Inter-Urban: No  
Parking Charges: Yes  
User Charges: No  
P&R Market Share: 4%, 10%, 30%, 45%

.....  
BASE PARAMETERS:  
Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20

YEAR 1:  
Average Daily Demand = 227  
Annual Demand = 56,629  
Discount Rate = 6.00%

Spaces in YEAR 15 = 2359  
Evaluation P&R Size = 3000  
Num Buses Required = 3

.....  
Capital Cost = £ 10,000,000  
(Scheme Life = 15 Years)

---

#### COST/BENEFIT ASSESSMENT:

##### PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -1,909,341  
A: Parking Revenue = £ -1,772,346  
U: P&R Charges = £ -2,922,950  
  
Total Cost = £ -7,154,386

##### PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 1,772,346  
O: P&R Charges = £ 2,922,950  
U: HGV VOC Savings = £ -82,273  
U: Car VOC Savings = £ -1,008,244  
U: Congestion Savings = £ 5,799,383  
U: Accident Savings = £ -1,621,988  
A: NM Parking Charges = £ 51,558,504

Total Benefits = £ 59,340,677

NET PRESENT VALUE (NPV) = £ 52,186,291

---

#### B/C INDICATORS

Operating B/C Ratio\* = 7.48  
Economic B/C Ratio\*\* = 8.29

#### IRR INDICATORS

IRR\*\*\* = -999.00

#### FIRST YEAR INDICATORS

PVC\* = -356277.04  
PVB\* = 969660.21  
Operating B/C Ratio\* = 2.72

PVC\*\* = -356277.04  
PVB\*\* = 702623.92  
Economic B/C Ratio\*\* = 1.97

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---

PREMod Results Site 4: A1060  
26/03/2001 13:01:00

.....  
FILE REFERENCE:

Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site4.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat  
.....

OPTION SELECTION:

Traffic Growth: Low  
With Bus Priority: Yes  
Include Inter-Urban: No  
Parking Charges: Yes  
User Charges: No  
P&R Market Share: 4%, 10%, 30%, 45%  
.....

BASE PARAMETERS:

Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20  
.....

YEAR 1:

Average Daily Demand = 159  
Annual Demand = 39,742  
Discount Rate = 6.00%  
.....

Spaces in YEAR 15 = 1337  
Evaluation P&R Size = 2000  
Num Buses Required = 1  
.....

Capital Cost = £ 8,000,000  
(Scheme Life = 15 Years)  
.....

---

COST/BENEFIT ASSESSMENT:

PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -872,664  
A: Parking Revenue = £ -2,349,054  
U: P&R Charges = £ -1,693,391

Total Cost = £ -5,464,858

PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 2,349,054  
O: P&R Charges = £ 1,693,391  
U: HGV VOC Savings = £ -120,184  
U: Car VOC Savings = £ -1,299,029  
U: Congestion Savings = £ 5,636,312  
U: Accident Savings = £ -2,191,991  
A: NM Parking Charges = £ 51,368,517

Total Benefits = £ 57,436,069

NET PRESENT VALUE (NPV) = £ 51,971,211  
.....

B/C INDICATORS

Operating B/C Ratio\* = 9.48  
Economic B/C Ratio\*\* = 10.51

IRR INDICATORS

IRR\*\*\* = -999.00

FIRST YEAR INDICATORS

PVC\* = -224118.65  
PVB\* = 907417.27  
Operating B/C Ratio\* = 4.05

PVC\*\* = -224118.65  
PVB\*\* = 1039386.97  
Economic B/C Ratio\*\* = 4.64

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings  
.....

PREMod Results Site 5: A414 East  
26/03/2001 13:01:10

.....  
FILE REFERENCE:  
Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site5.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat

.....  
OPTION SELECTION:  
Traffic Growth: Low  
With Bus Priority: Yes  
Include Inter-Urban: No  
Parking Charges: Yes  
User Charges: No  
P&R Market Share: 4%, 10%, 30%, 45%

.....  
BASE PARAMETERS:  
Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20

YEAR 1:  
Average Daily Demand = 239  
Annual Demand = 59,842  
Discount Rate = 6.00%

Spaces in YEAR 15 = 2259  
Evaluation P&R Size = 3000  
Num Buses Required = 3

.....  
Capital Cost = £ 10,000,000  
(Scheme Life = 15 Years)

---

COST/BENEFIT ASSESSMENT:

PRESENT VALUE COSTS (PVC)  
A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -1,822,561  
A: Parking Revenue = £ -2,008,626  
U: P&R Charges = £ -2,940,679  
  
Total Cost = £ -7,321,617

PRESENT VALUE BENEFITS (PVB)  
U: Parking Charges = £ 2,008,626  
O: P&R Charges = £ 2,940,679  
U: HGV VOC Savings = £ -145,946  
U: Car VOC Savings = £ -1,482,814  
U: Congestion Savings = £ -20,818,902  
U: Accident Savings = £ -2,510,381  
A: NM Parking Charges = £ 51,594,773

Total Benefits = £ 31,586,035

NET PRESENT VALUE (NPV) = £ 24,264,418

---

B/C INDICATORS

Operating B/C Ratio\* = 7.16  
Economic B/C Ratio\*\* = 4.31

IRR INDICATORS

IRR\*\*\* = 15.16

FIRST YEAR INDICATORS

PVC\* = -363109.10  
PVB\* = 847299.91  
Operating B/C Ratio\* = 2.33

PVC\*\* = -363109.10  
PVB\*\* = -1163428.19  
Economic B/C Ratio\*\* = -3.20

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---

PREMod Results Site 6: A414 West  
26/03/2001 13:01:18

.....  
FILE REFERENCE:

Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site6.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat

.....  
OPTION SELECTION:

Traffic Growth: Low  
With Bus Priority: Yes  
Include Inter-Urban: No  
Parking Charges: Yes  
User Charges: No  
P&R Market Share: 4%, 10%, 30%, 45%

.....  
BASE PARAMETERS:

Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20

YEAR 1:

Average Daily Demand = 380  
Annual Demand = 95,099  
Discount Rate = 6.00%

Spaces in YEAR 15 = 3006  
Evaluation P&R Size = 3000  
Num Buses Required = 2

.....  
Capital Cost = £ 10,000,000  
(Scheme Life = 15 Years)

---

COST/BENEFIT ASSESSMENT:

PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -1,036,677  
A: Parking Revenue = £ -4,063,096  
U: P&R Charges = £ -3,691,292

Total Cost = £ -9,340,815

PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 4,063,096  
O: P&R Charges = £ 3,691,292  
U: HGV VOC Savings = £ -63,035  
U: Car VOC Savings = £ -782,818  
U: Congestion Savings = £ 6,292,589  
U: Accident Savings = £ -1,068,216  
A: NM Parking Charges = £ 50,108,383

Total Benefits = £ 62,241,291

NET PRESENT VALUE (NPV) = £ 52,900,476

---

B/C INDICATORS

Operating B/C Ratio\* = 5.99  
Economic B/C Ratio\*\* = 6.66

IRR INDICATORS

IRR\*\*\* = -999.00

FIRST YEAR INDICATORS

PVC\* = -345911.81  
PVB\* = 933758.73  
Operating B/C Ratio\* = 2.70

PVC\*\* = -345911.81  
PVB\*\* = 1090460.03  
Economic B/C Ratio\*\* = 3.15

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---

.....  
FILE REFERENCE:

Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site7.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat

.....  
OPTION SELECTION:

Traffic Growth: Low  
With Bus Priority: Yes  
Include Inter-Urban: No  
Parking Charges: Yes  
User Charges: No  
P&R Market Share: 4%, 10%, 30%, 45%

.....  
BASE PARAMETERS:

Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20

YEAR 1:

Average Daily Demand = 119  
Annual Demand = 29,668  
Discount Rate = 6.00%

Spaces in YEAR 15 = 638  
Evaluation P&R Size = 800  
Num Buses Required = 3

.....  
Capital Cost = £ 3,000,000  
(Scheme Life = 15 Years)

---

COST/BENEFIT ASSESSMENT:

PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -1,864,687  
A: Parking Revenue = £ -2,222,857  
U: P&R Charges = £ -820,909

Total Cost = £ -5,458,203

PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 2,222,857  
O: P&R Charges = £ 820,909  
U: HGV VOC Savings = £ -113,709  
U: Car VOC Savings = £ -1,229,660  
U: Congestion Savings = £ -12,177,129  
U: Accident Savings = £ -1,971,200  
A: NM Parking Charges = £ 51,586,258

Total Benefits = £ 39,138,326

NET PRESENT VALUE (NPV) = £ 33,680,123

---

B/C INDICATORS

Operating B/C Ratio\* = 9.40  
Economic B/C Ratio\*\* = 7.17

IRR INDICATORS

IRR\*\*\* = -999.00

FIRST YEAR INDICATORS

PVC\* = -277247.32  
PVB\* = 766990.51  
Operating B/C Ratio\* = 2.77

PVC\*\* = -277247.32  
PVB\*\* = 702155.05  
Economic B/C Ratio\*\* = 2.53

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---



.....  
FILE REFERENCE:

Parameter File: C:\P&RModel\Data\HighMS.par  
Site File: C:\P&RModel\Data\Site8.def  
COBA File: C:\P&RModel\Data\Coba.def  
Do-Nothing File: C:\P&RModel\Data\DN.dat  
.....

OPTION SELECTION:

Traffic Growth: Low  
With Bus Priority: Yes  
Include Inter-Urban: No  
Parking Charges: Yes  
User Charges: No  
P&R Market Share: 4%, 10%, 30%, 45%  
.....

BASE PARAMETERS:

Fare Levels (pence) = 80  
Peak Headway (min) = 10  
Off-Peak Headway (min) = 20  
.....

YEAR 1:

Average Daily Demand = 350  
Annual Demand = 87,390  
Discount Rate = 6.00%  
.....

Spaces in YEAR 15 = 3145  
Evaluation P&R Size = 3000  
Num Buses Required = 3  
.....

Capital Cost = £ 10,000,000  
(Scheme Life = 15 Years)

---

COST/BENEFIT ASSESSMENT:

PRESENT VALUE COSTS (PVC)

A: Site Operating Cost = £ -549,750  
O: Bus Operating Cost = £ -1,909,341  
A: Parking Revenue = £ -2,432,867  
U: P&R Charges = £ -4,118,250

Total Cost = £ -9,010,208

PRESENT VALUE BENEFITS (PVB)

U: Parking Charges = £ 2,432,867  
O: P&R Charges = £ 4,118,250  
U: HGV VOC Savings = £ -136,744  
U: Car VOC Savings = £ -1,386,376  
U: Congestion Savings = £ -33,451,533  
U: Accident Savings = £ -2,317,560  
A: NM Parking Charges = £ 51,354,348

Total Benefits = £ 20,613,251

NET PRESENT VALUE (NPV) = £ 11,603,042

---

B/C INDICATORS

Operating B/C Ratio\* = 6.00  
Economic B/C Ratio\*\* = 2.29

IRR INDICATORS

IRR\*\*\* = 12.83

FIRST YEAR INDICATORS

PVC\* = -425738.04  
PVB\* = 935927.39  
Operating B/C Ratio\* = 2.20  
  
PVC\*\* = -425738.04  
PVB\*\* = -1194343.61  
Economic B/C Ratio\*\* = -2.81

\* Excludes Congestion Savings

\*\* Includes Congestion Savings

\*\*\* Includes Capital Cost & Congestion Savings

---



**Essex County Council  
Chelmsford Borough Council**

**Chelmsford Park & Ride  
PreMod Computer Model  
Technical Specifications**

March 2001

Prepared for:  
Essex County Council,  
County Hall,  
Chelmsford,  
Essex, CM1 1QH

Prepared by:  
WS Atkins Consultants Limited,  
Threadneedle House, 9-10 Market Road,  
CHELMSFORD, CM1 1JQ.

Document Version:      Doc.Reg. - 04      Rev. 0      Issue Date: 25 March 2001

File Reference:    AI/

## **C O N T E N T S**

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**SPECIMEN DATA FILES**

## **1. INTRODUCTION**

This document provides an overview of the PreMod computer model and defines the main parameter relationships used in the model. The purpose and main attributes of the model are broadly describes along with an overview of the user interface, data input and data output. A more detailed specification is given of the overall model as well as the derivation of the individual model components. Specimen data files are attached at the end of the document for reference purposes.

## **2. PURPOSE**

The PreMod computer model has been developed to enable quick turnaround financial and economic assessments of single or combinations of potential Park & Ride sites. Although primarily intended as a coarse level evaluation tool, the model incorporates a broad array of determinants under the control of the user and allows considerable flexibility in assessing wide ranging “what if?” scenarios. The model and its approach towards managing the data and the financial and economic assessment of potential sites also ensures a degree of consistency throughout the evaluation process thereby increasing confidence in the comparison of scenario outcomes.

## **3. MODEL ATTRIBUTES**

PreMod is essentially a deterministic model. It calls on a consistent and comprehensive bank of data to both manage the evaluation process and to assess the key financial and economic indicators in response to user requests.

The model uses SATURN data to take snapshots of the traffic network status in the “Do nothing” and the “Do something” scenarios as well as at intervals over the lifetime of the proposed Park & Ride scheme. This approach takes advantage of the capabilities of SATURN to evaluate key determinants such as traffic volumes and congestion delays etc., needed for the financial and economic evaluation of a scheme. The model furthermore incorporates guidelines as set out by the Department of Transport’s COBA manual for carrying out financial and economic assessments of highway schemes.

One of the aims in the development of PreMod has been to maximize user control over variables and to facilitate wide-ranging scenario testing. Users can therefore set-up a range of data input files thereby defining the sensitivities for key variables that can then be applied consistently to a range of Park & Ride scenarios. The user can therefore fully define a model run from the user interface. The user selects a relevant data input file (*PreMod.par* file) and sets the main scenario parameters on screen, namely, the traffic growth scenario to be applied, the site or site combination to be assessed, whether to include or exclude new measures, and the Park & Ride corridor market share scenario to be applied.

It should be stressed that PreMod has certain limitations and should therefore be used and interpreted sensibly. In particular the following should be borne in mind:

As with all financial and economic assessments, PreMod weighs the costs and benefits to produce single indicators to compare the relative merits of different schemes or variations within a scheme. When applied at the coarse level of evaluation and where the various cost and benefit in terms of input parameters amount to rough estimates, the results could be misleading. Ranging values for sensitive input parameters should therefore be applied to cater for uncertainties.

A further and more intrinsic limitation to the model in its present form is the inherent assumption regarding the inter-modal shift elasticity between private car and Park & Ride usage. This is an area on which only limited research is available.

For simplicity the model assumes a linear elastic relationship with overall journey cost and that the costs function is significantly influence by parking restraint measures, i.e. increase in town center parking charges. While this may or may not be the case and with the possibility of other measures being more effective in this regard, the assumption and inclusion of a counter balance in the model to counteract the impacts of bus priority measures on traffic congestion costs is essential. Thus while the model provides a useful mechanism to deal with the dynamics of mode shift the above limitation needs to be borne in mind when interpreting the results from the model.

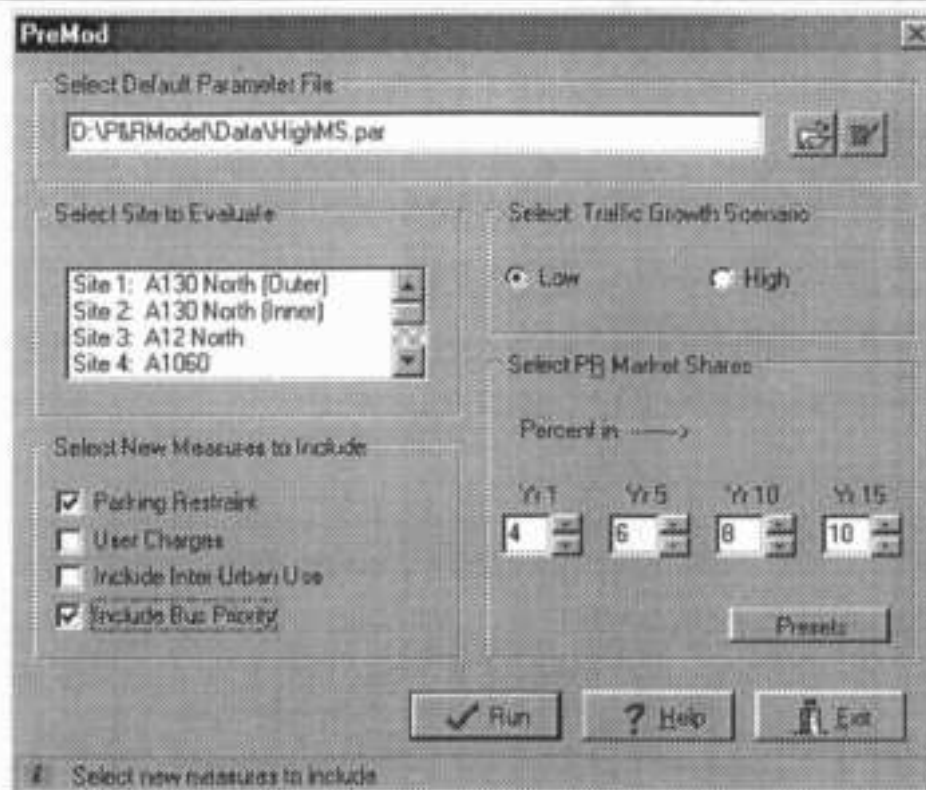
#### **4. USER INTERFACE**

PreMod user interface as shown overleaf allows selection of the following options to define the model run:

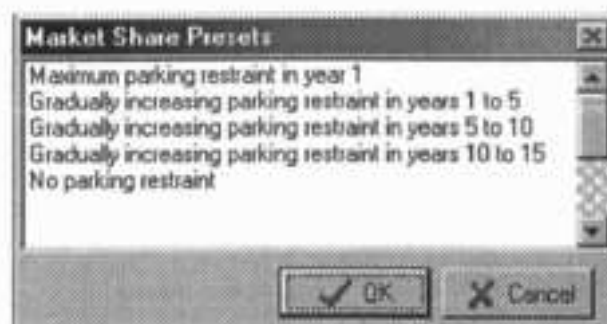
- Default parameter file.
- Park & Ride site selection for evaluation.
- Traffic growth scenario.
- New measures to include in the evaluation.
- Park & Ride corridor market share scenario.

PreMod automatically searches for the relevant *Site.def* and *Scenario.dat* data input files based on the site selection for evaluation. The *Site.def* files exist for each Park & Ride site and contain site specific parameter definitions. *Scenario.dat* input files exist for each site scenario, i.e. either individual sites or combination of sites, and contain the specific SATURN output information relating to that scenario. (Data input requirements is discussed in more detail later.)

The selection of corridor market share scenario values is either via the spin buttons alongside the box for each year, or by selecting a preset range of values. The preset range of values as shown below enables quick and consistent selection of market share mix between successive model runs.



**PreMod MAIN USER INTERFACE SCREEN**

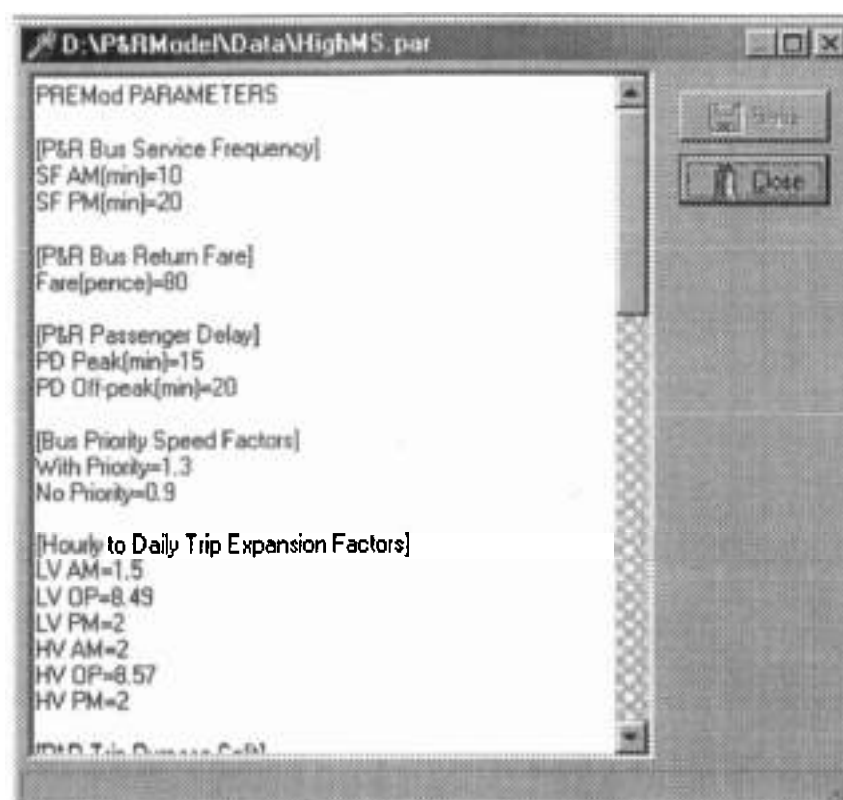


**SELECTION OF CORRIDOR MARKET SHARE PRESETS**

Users can select a traffic growth scenario as well as whether to include or exclude specific new measures such as parking restraint.

The default parameter file selected can also be edited directly from the main user interface screen, or simply referenced in the course of a model run to check on parameter values as shown below:

Model run results are presented in PreMod both in summary table and graphical form for on-screen examination and can be saved to file and printed for later reference. A typical summary result table is shown below followed by typical on-screen-graphical results.

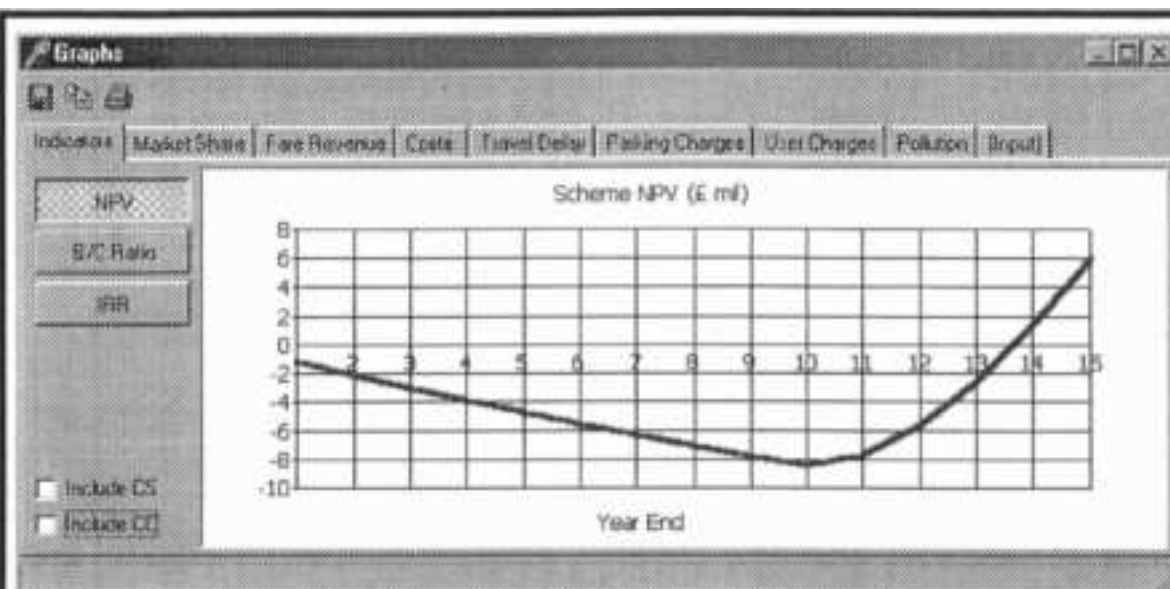


**PreMod DEFAULT PARAMETER FILE EDITOR**

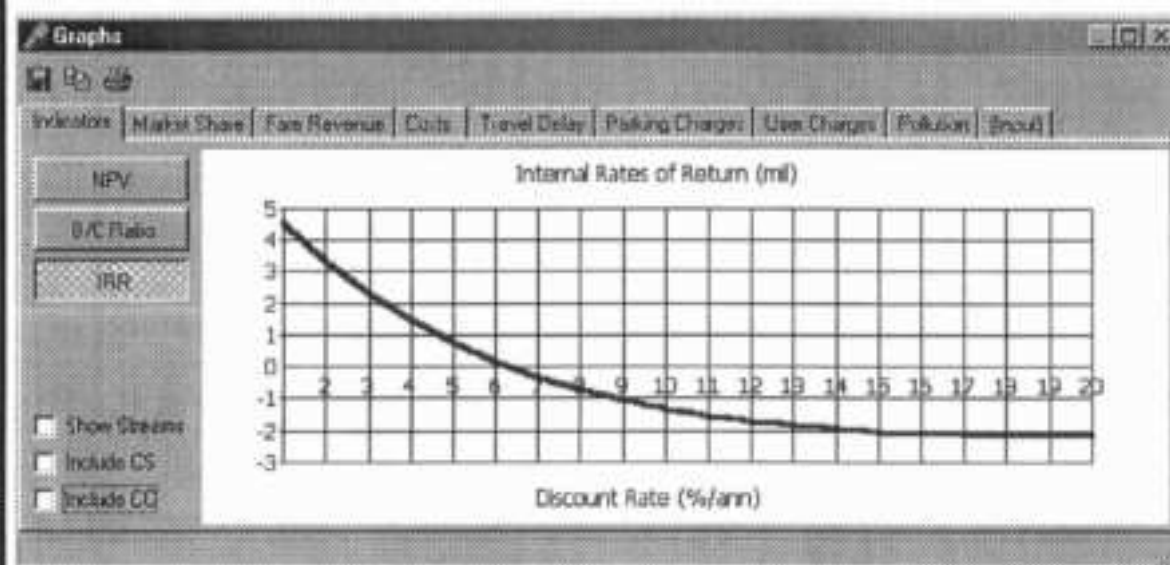
Results	
COST/BENEFIT ASSESSMENT:	
PRESENT VALUE COSTS (PVC)	
A: Site Operating Cost	= £ -549,750
O: Bus Operating Cost	= £ -1,956,674
A: Parking Revenue	= £ -1,458,326
U: P&R Charges	= £ -1,431,546
Total Cost	= £ -5,396,295
PRESENT VALUE BENEFITS (PVB)	
U: Parking Charges	= £ 1,458,326
O: P&R Charges	= £ 1,431,546
U: HGV VOC Savings	= £ -307,348
U: Car VOC Savings	= £ -2,973,364
U: Congestion Savings	= £ -49,328,752
U: Accident Savings	= £ -5,504,844
A: NM Parking Charges	= £ 0
Total Benefits	= £ -55,224,436
NET PRESENT VALUE (NPV)	= £ -60,620,732
B/C INDICATORS	
Operating B/C Ratio*	= -1.09
Economic B/C Ratio**	= -10.23

**TYPICAL SUMMARY RESULT TABLE**





**NPV TREND LINE**



**IRR TREND LINE**

## **5. INPUT DATA**

Data input for the model is by way of pre-prepared data files as well as selection from the user interface at the time of running the model.

The following pre-prepared data files are required to run the model (specimens of these files are attached to the back of this document):

Default Parameter File – *Default.par*

The default parameter file defines information about the following general parameter and applies to all sites and scenarios:

- P&R Bus Service Frequency
- P&R Bus Return Fare
- P&R Passenger Delay
- Bus Priority Speed Factors
- Hourly to Daily Trip Expansion Factors
- P&R Trip Purpose Split
- Parking Trip Purpose Split
- Work Based Parking
- Non-Work Based Parking
- Parking Charges
- New Measures Parking Hike Factors (Parking Restraint)
- New Measures User Charging (Trips to town center)
- Discount Rate

#### Site Definition File – Site.def

Site definition files exist for each site and define the following site-specific parameters:

- Scheme Costs
- Location Data
- Inter-Urban Trips
- Inter-Urban Fares
- Inter-Urban Service Frequency
- Inter-Urban Travel Distance

#### Scenario Definition Files – Scenario.dat

Two scenario definition files are needed to run the mode, the first detailing aggregated SATURN results for the “Do nothing” case and the second for the “Do something” case.

While the “Do nothing” scenario definition file is generated only once, separate input files need to be generated for each site, site combination, or any scenario change made that requires the SATURN model to be re-run.

In particular PreMod uses the following aggregate output generated from successive runs of the SATURN model to fully define a particular Park & Ride scenario:

Typically for the opening year “Do nothing” case, and for the opening year and year 5, 10 and 15 for the “Do something” case, and in each instance for the AM, PM and Off-Peak hour:-

- Total number of trips on the network by vehicle class.
- Total number of trips travelling to the town center by vehicle class.
- Total travel time on the network by vehicle class.

- Total distance traveled on the network by vehicle class.
- Average travel speed on the network.
- Aggregate pollution levels.

#### COBA definition File – COBA.def

The COBA definition file defines information for the following parameters derived from the Department of Transport COBA manual and used by the model:

- COBA Trip Purpose Split
- Flow Group Proportions VOC
- VOC Coefficients
- VOC Compound Ann Growth
- Vehicle Occupancy
- Value of Time
- Accident Costs

The following additional scenario definition needs to be selected from the user interface prior to running the model:

#### Traffic Growth Scenario

Traffic growth relates to forecast growth and corresponds to the Essex low and high growth scenarios as applied in the structure planning for the region.

#### Include/Exclude New Measures

The option exists at run time to either include or exclude the following specific new measures:

- Parking Restraint
- User Charges
- Inter-Urban Use
- Bus Priority

Note that user charges and inter-urban use of Park & Ride site options are not activated in the model at this stage.

#### Corridor Market Share Scenario

The user can either define specific corridor market share values or select preset values at run time.

## **6. OUTPUT DATA**

PreMod computes the following key economic indicators for the scheme tested:

#### **Present Value Costs (PVC)**

## **PreMod Technical Specification**

- Site operating (cost to local authority).
- Bus operating (cost to operators).
- Parking revenue loss (cost to local authority).
- P&R charges (cost to P&R users).

### **Present Value Benefits (PVB)**

- Parking charges (equates to the above parking revenue loss and is a saving to P&R users).
- P&R charges (equates to the above P&R charges and is a benefit to operators).
- Heavy vehicle operating costs (cost/saving to other network users).
- Car operating costs (cost/saving to other network users).
- Congestion costs (cost/saving to other network users).
- Accident costs (cost/saving to other network users).
- Parking Restraint Charges (benefit to local authority).

### **Net Present Value (NPV) = (PVB – PVC)**

(Note that pollution and road user charging are not implemented in the model at this stage.)

The model generates the following additional economic indicators:

Lifetime of the scheme indicators:

<b>Operating B/C ratio</b>	<b>(Excludes congestion delay savings)</b>
<b>Economic B/C ratio</b>	<b>(Includes congestion delay savings)</b>

### **Internal Rates of Return (IRR)**

First year indicators (excluding congestion delay savings):

**First year PVC**  
**First year PVB**  
**First year Operating B/C ratio**

First year indicators (including congestion delay savings):

**First year PVC**  
**First year PVB**  
**First year Economic B/C ratio**

## **7. MODEL FORM**

PreMod is a deterministic model based on the interpolation of time slice information over the lifetime of a scheme. The lifetime of schemes is set to 15 years in the model and time slice information is generated as input data to the model for the opening year and years 5, 10 and 15. The model interpolates the data to produce a matrix of annual data for each successive year in the lifetime of the scheme. The resulting annual data is then discounted in the model to produce the relevant "Present Value" indicators for the scheme.

General form:

$$\text{Scheme Value} = \text{NPV}_{\text{SCHEME}} = f\{(\text{Financial}_{\text{CASE}}), (\text{Economic}_{\text{CASE}}), (\text{Discount Rate})\}$$

$$\text{NPV}_{\text{SCHEME}} = \sum_{n=1}^N \{(\text{Financial}_{\text{CASE}}) + (\text{Economic}_{\text{CASE}})\}_n (\text{DISCOUNTED})$$

$$\text{Financial}_{\text{CASE}} = f\{(\text{CC}), (\text{OC})\}$$

$$\text{CC} = f\{(\text{Land Acquisition}), (\text{P\&R Implementation})\}_{\text{COST}}$$

$$\text{OC} = f\{(\text{MC}), (\text{BC}), (\text{HVC}), (\text{LVC}), (\text{ParkRevLoss}), (\text{FareRev}), (\text{ParkRestraintRev}), (\text{UserChargingRev})\}_{\text{COST/REVENUE}}$$

$$\text{Economic}_{\text{CASE}} = f\{(\text{Delay}), (\text{Accident}), (\text{Pollution})\}_{\text{COST/SAVING}}$$

Where:

Scheme Value:	Is the Net Present Value (NPV) of the scheme at the end of the 15-year lifetime.
Financial <sub>CASE</sub> :	Represents actual cost / revenue streams.
Economic <sub>CASE</sub> :	Represents the value of social costs and benefits.
Discount Rate:	Standard annual discount rate.
CC:	Capital cost of scheme.
Land Acquisition:	Land purchase costs.
P&R Implementation:	P&R construction costs.
MC:	Site maintenance costs.
BC:	Bus costs.
HVC:	Heavy vehicle costs.
LVC:	Light vehicle costs.
ParRevLoss:	Parking revenue loss.
FareRev:	Fare revenue.
ParkRestraintRev:	Parking restraint revenue.
UserChargeRev:	Revenue from user charges.
Delay COST/SAVING:	Congestion delay costs / savings.
Accident COST/SAVING:	Accident costs / savings.
Pollution COST/SAVING:	Pollution costs / savings.

PreMod computes the following key economic indicators for the scheme tested:

Present Value Costs (PVC)

Present Value Benefits (PVB)

Net Present Value (NPV) = (PVB – PVC)

Operating B/C ratio

(Excludes congestion delay savings)

Economic B/C ratio

(Includes congestion delay savings)

Internal Rates of Return (IRR)

First year PVC

(Excludes congestion delay savings)

First year PVB

(Excludes congestion delay savings)

First year Operating B/C ratio

First year PVC

(Includes congestion delay savings)

First year PVB

(Includes congestion delay savings)

First year Economic B/C ratio

## **8. MODEL SPECIFICATIONS**

### **SCHEME COSTS**

Scheme costs are the fixed cost to the local authority represented by the initial capital cost outlay in developing a Park & Ride site. This cost factor is intended in the model to reflect land costs and site development costs, however, excludes operator outlay costs in acquiring vehicles to run the Park & Ride operation.

General form:

**CC = f{(Scheme Type), (Scheme Type Cost)}**

Where:

**Scheme Type:** Represents the size of Park & Ride side needed in term of forecast space requirements in year 15 and equates to the absolute AM-Peak plus half the Off-Peak demand in that year.

**Scheme Type Cost:** Is the estimated capital costs for each scheme type. The following scheme types are applied in the model:

- Type 1 - 200 spaces
- Type 2 - 400 spaces
- Type 3 - 600 spaces
- Type 4 - 800 spaces
- Type 5 - 1,200 spaces
- Type 6 - 2,000 spaces
- Type 7 - 3,000 spaces

Scheme type costs are user defined for each site in the *Site.def* data input files.

## **MAINTENANCE COSTS**

Maintenance costs are the fixed costs to the local authority represented by the cost of maintaining the Park & Ride site. These costs are annualized in the model for each year of the scheme life.

General form:

$$MC = f\{(\text{Annual Maintenance Cost})\}$$

Annual maintenance costs are user defined for each site in the *Site.def* data input files.

## **BUS COSTS**

Bus costs are the variable costs to the bus operator(s) represented by the annual all-in cost of acquiring, maintaining and operating buses needed to service the Park & Ride site. Bus costs are annualized in the model for each year of the scheme life.

General form:

$$BC = \text{Number}_{\text{buses}} \times \text{Unit}_{\text{cost}}$$

$$\text{Number}_{\text{buses}} = f\{(\text{Round Trip Distance}), (\text{Average Speed}), (\text{Headway})\}$$

$$\text{Average Speed} = f\{(\text{Bus Priority})\}$$

Where:

Number <sub>buses</sub> :	Is the minimum number of buses needed to service the particular site.
Round Trip Distance:	Round trip distance between the Park & Ride site and the town center.
Average Speed:	Average bus travel speed is governed in the model by the inclusion, or exclusion of bus priority measures and is determined on the basis of speeds derived from the SATURN model runs. Bus priority speed factors are user defined in the <i>PreMod.par</i> data input file. These factors typically equate to 1.3 times the SATURN average network speed where priority is included, and 0.9 times the SATURN average network speed where priority is excluded.

**Headway:** Is the time gap between successive services, or service frequency at the Park & Ride site, at different times of the day, namely, during the peak and off-peak periods. Bus service frequencies are user defined in the *PreMod.par* data input file.

**Unit<sub>cost</sub>:** Average annual all-in cost per bus to the operator. Unit bus costs are derived directly from industry statistics and equates to £95,243 per annum. This value is fixed in the model.

## **HEAVY VEHICLE COSTS**

Heavy vehicle costs represents the net saving or net additional cost to heavy vehicle operators resulting from the implementation of the Park & Ride scheme. These costs are annualized in the model for each year of the scheme life.

General form:

$$\text{HVCost} = f\{(\text{DS}_{\text{HVOC}} - \text{DN}_{\text{HVOC}})\} \quad \text{-ve} = (\text{net savings}) \quad \text{+ve} = (\text{net loss})$$

$$\text{HVOC} = f\{(\text{Average Speed})\}$$

$$\text{Average Speed} = f\{(\text{Bus Priority})\}$$

Where:

**HVCost:** Net operating loss or savings to heavy vehicle operators.

**DS<sub>HVOC</sub>:** “Do something” heavy vehicle operating costs.

**DN<sub>HVOC</sub>:** “Do nothing” heavy vehicle operating costs.

**HVOC:** Heavy vehicle operating cost determined in accordance with the Department of Transport COBA manual. Standard parameters in this regard are user defined in the *Coba.def* data input file.

**Average Speed:** Average travel speed on the network is governed in the model by the inclusion, or exclusion of bus priority measures and is determined on the basis of speeds derived from the SATURN model runs.



## **CAR COSTS**

Car costs represents the net saving or net additional vehicle operating cost to other motorists resulting from the implementation of the Park & Ride scheme. These costs are annualized in the model for each year of the scheme life.

General form:

$$\text{LVCost} = f\{(DS_{LVOC} - DN_{LVOC})\} \quad -ve = (\text{net savings}) \quad +ve = (\text{net loss})$$

$$LVOC = f\{(\text{Average Speed})\}$$

$$\text{Average Speed} = f\{(\text{Bus Priority})\}$$

Where:

LVCost: Net vehicle operating loss or savings to other motorists on the network.

DS<sub>LVOC</sub>: “Do something” light vehicle operating costs.

DN<sub>LVOC</sub>: “Do nothing” light vehicle operating costs.

LVOC: Light vehicle operating cost determined in accordance with the Department of Transport COBA manual. Standard parameters in this regard are user defined in the *Coba.def* data input file.

Average Speed: Average travel speed on the network is governed in the model by the inclusion, or exclusion of bus priority measures and is determined on the basis of speeds derived from the SATURN model runs.

## **PARKING REVENUE LOSS**

Parking revenue loss represents the loss of revenue to the local authority in parking charges from motorists who switch from private travel to Park & Ride. These costs are annualized in the model for each year of the scheme life.

General form:

$$\text{ParkRevLoss} = f\{(DN_{REV} - DS_{REV})\} \quad +ve \text{ indicates real cost to local authority}$$

$$DN_{REV} \text{ \& } DS_{REV} = f\{(\text{P\&R Market Share}), (\text{Parking Split}), (\text{Parking Charges})\}$$

Where:

ParkRevLoss:	Is the loss of parking revenue to the local authority.
DN <sub>REV</sub> :	Is the generation of parking revenue in the "Do nothing" scenario.
DS <sub>REV</sub> :	Is the generation of parking revenue in the "Do nothing" scenario.
P&R Market Share:	Relates directly to the Park & Ride market share scenarios applied in the model and is determined interactively by the model user when running the model. Note that the "Do nothing" scenario equates to a zero market share.
Parking Split:	Defines the proportions and relationships between work and non-work, peak and off-peak, short and long stay parking, as well as private non-residential parking. Parking split factors are user defined in the <i>PreMod.par</i> data input file. Similarly the work to non-work trip purpose split is defined user defined in the <i>Coba.def</i> data input file in accordance with Department of Transport COBA manual guidelines.

## **ACCIDENT COSTS**

Accident costs represent the net loss or savings in accident costs as a result of the implementation of the scheme. These costs are annualized in the model for each year of the scheme life.

General form:

$$ACC_{COST} = f\{(ACC_{RATE}), (Annual\ KM\ Travel), (Accident\ Unit\ Cost)\}$$

Where:

ACC <sub>COST</sub> :	Is the net loss or savings in accident related costs.
ACC <sub>RATE</sub> :	Is the accident occurrence rate per million kilometers of travel on the network. This factor is user defined in the <i>Coba.def</i> data input file in accordance with Department of Transport COBA manual guidelines.
Annual KM Travel:	Annual network kilometers of travel are determined directly from the SATURN model runs.

## **FARE REVENUE**

Fare revenue represents the charges levied on Park & Ride users in the “Do something” scenario and generally takes the form of a bus fare collected directly by the bus operator. Fare revenue is annualized in the model for each year of the scheme life.

General form:

$$\text{FARE}_{\text{REV}} = f\{(\text{Annual Passengers}), (\text{Fares})\}$$

$$\text{Annual Passengers} = f\{(\text{P\&R Market Share}), (\text{Veh}_{\text{occ}})\}$$

Where:

**FARE<sub>REV</sub>:** Is the annual revenue derived from fares.

**Annual Passengers:** Is the forecast number of annual Park & Ride users.

**P&R Market Share:** Relates directly to the Park & Ride market share scenarios applied in the model and is determined interactively by the model user when running the model.

**VEH<sub>occ</sub>:** Is the vehicle occupancy factors applied to translate market share of vehicles to Park & Ride bus passengers. These factors are user defined in the *Coba.def* data input file in accordance with Department of Transport COBA manual guidelines.

## **PARKING RESTRAINT**

Parking restraint represents parking revenues to the local authority resulting from increased town center parking charges applied specifically to attract Park & Ride patronage. The inclusion of a parking restraint sub-model is needed to counter balance the high negative impact of bus priority on congestion delays by mirroring concomitant measures towards increasing Park & Ride market shares. Excess parking revenue associated with parking restraint measures is annualized in the model for each year of the scheme life.

General form:

$$\text{ParkRevGain} = f\{(\text{DS}_{\text{PARKING DEMAND}})\}$$

$$\text{DS}_{\text{PARKING DEMAND}} = f\{(\text{P\&R Market Share}), (\text{Parking Split}), (\text{Parking Charges})\}$$

Where:

ParkRevGain:	Is the excess revenue derived from parking restraint measures.
DS <sub>PARKING DEMAND</sub> :	Is the demand for town center parking for a given Park & Ride market share in the "Do nothing" scenario.
P&R Market Share:	Relates directly to the Park & Ride market share scenarios applied in the model and is determined interactively by the model user when running the model with parking restraint applied.
Parking Split:	Defines the proportions and relationships between work and non-work, peak and off-peak, short and long stay parking, as well as private non-residential parking. Parking split factors are user defined in the <i>PreMod.par</i> data input file. Similarly the work to non-work trip purpose split is defined user defined in the <i>Coba.def</i> data input file in accordance with Department of Transport COBA manual guidelines.
Parking Charges:	Is defined by the excess parking charges applied, i.e. the increase over and above base level charges, attributable to gaining additional Park & Ride market share.

The level of parking charges is controlled by the model in terms of "Lower" (low market share) and "Upper" (high market share) scenarios. The latter are predefined in the model at this stage as follows: The "Lower" scenario assumes Park & Ride market share on corridors will grow from 4% in year 1 to 6%, 8% and 10% in years 5, 10 and 15 respectively, and that no excess parking charges are applied. The "Upper" scenario assumes parking restraint measures are applied fully from day one and that market share on town center bound traffic on corridors will increase to 10% in year 1 and grow to 30%, 40% and 50% in years 5, 10 and 15 respectively. The new measures parking charge factors applied in the model are user defined in the *PreMod.par* data input file.

The model assumes a linear elastic relationships exists between market share and parking charges within the range of the "Lower" and "Upper" scenarios.

## USER CHARGING

User charging embodies additional measures at reducing town center traffic whereby drivers or vehicles are charged on the basis of road space usage. Revenue to the local authority derived from such measures being applied is annualized in the model for each year of the scheme life. (Note that this feature is not currently active in the model.)

General form:

$$\text{UserRev} = f((\text{DS}_{\text{TOWN CENTER TRIPS}}))$$

$$\text{DS}_{\text{TOWN CENTER TRIPS}} = f((\text{P\&R Market Share}), (\text{User Charges}))$$

Where:

UserRev:	Is the revenue derived from user charging measures.
DS <sub>TOWN CENTER TRIPS</sub> :	Is the volume of traffic travelling to or passing through the town center traffic network.
P&R Market Share:	Relates directly to the Park & Ride market share scenarios applied in the model and is determined interactively by the model user when running the model with parking restraint applied.
User Charges:	Is the charge levied on drivers or vehicles entering the town center traffic network at different times of the day. User charges are constant for the life of the scheme, and is turned on or off interactively by the user when running the model. The levels of user charges applied in the model are defined in the <i>PreMod.par</i> data input file.

## CONGESTION DELAY

Congestion delay represents the costs associated with delays to network users resulting from the implementation of Park & Ride measures. Excess congestion delay costs are annualized in the model for each year of the scheme life.

General form:

$$\text{Delay}_{\text{COST}} = f((\Delta_{\text{TT}}), (\text{Value of Time}))$$

$$\Delta_{\text{TT}} = f((\text{DS}_{\text{TT}}), (\text{DN}_{\text{TT}}), (\text{P\&R}_{\text{DELAY}}))$$

Where:

**Delay<sub>COST</sub>:** Is the excess cost of congestion delay to network users compared with the “Do nothing” scenario.

**$\Delta$ TT:** Is the net excess travel time delay to network users compared with the “Do nothing” scenario.

**Value of Time:** Is the value of time in monetary terms associated with each class of road user. Value of time indices are user defined in the *Coba.def* data input file in accordance with Department of Transport COBA manual guidelines.

**DS<sub>TT</sub>:** Is the total network travel time for the “Do something” scenario derived directly from the SATURN model runs.

**DN<sub>TT</sub>:** Is the total network travel time for the “Do nothing” scenario derived directly from the SATURN model runs.

**P&R<sub>DELAY</sub>:** Is the excess delay in using Park & Ride compared with not using Park & Ride.

PREMod COBA FILE

[COBA Trip Purpose Split]  
Proportion Work AM(%)=90  
Proportion Work OP(%)=40

[Flow Group Proportions VOC]  
LGV=10  
OGV1=1  
OGV2=1

[VOC Coefficients (1994)]  
aCar=0.592  
aLGV=0.922  
aOGV1=2.051  
aOGV2=1.601  
aPSV=3.027  
bCar=20.39  
bLGV=24.32  
bOGV1=51.22  
bOGV2=145.75  
bPSV=86.33  
cCar=0.0000430  
cLGV=0.0000577  
cOGV1=0.0002708  
cOGV2=0.0003823  
cPSV=0.0003051  
a'Car=3.279  
a'LGV=3.838  
a'OGV1=7.815  
a'OGV2=8.727  
a'PSV=16.188  
b'Car=12.08  
b'LGV=38.51  
b'OGV1=118.39  
b'OGV2=239.82  
b'PSV=271.40

[VOC Compound Ann Growth]  
LG Car/LGV 94-96(%)=-8.38  
LG OGV 94-96(%)=-7.00  
LG Car/LGV 96-02(%)=-2.09  
LG OGV 96-02(%)=-2.63  
LG Car/LGV 02-13(%)=-1.21  
LG OGV 02-13(%)=-0.97  
LG Car/LGV 13-15(%)=-0.18  
LG OGV 13-15(%)=-1.00  
HG Car/LGV 94-96(%)=-8.38  
HG OGV 94-96(%)=-7.00  
HG Car/LGV 96-02(%)=0.96  
HG OGV 96-02(%)=0.32  
HG Car/LGV 02-13(%)=-1.18  
HG OGV 02-13(%)=-1.00  
HG Car/LGV 13-15(%)=-0.17  
HG OGV 13-15(%)=-1.00

[Vehicle Occupancy (1994)]  
Working Car=1.11  
Non-Working Car=1.74  
LG Non-Working Ann Growth(%/ann)=-0.16  
HG Non-Working Ann Growth(%/ann)=-0.25

[Value of Time (1994)]  
Working Car(p/veh)=600  
Non-Working Car(p/veh)=548.1  
Ave LGV(p/veh)=1166.7  
Ave OGV(p/veh)=946.0  
LG VOT Growth 94-96(%/ann)=1.173  
LG VOT Growth 96-01(%/ann)=1.265  
LG VOT Growth 01-06(%/ann)=1.468  
LG VOT Growth 06-15(%/ann)=2.034  
HG VOT Growth 94-96(%/ann)=1.173  
HG VOT Growth 96-01(%/ann)=3.260  
HG VOT Growth 01-06(%/ann)=2.666  
HG VOT Growth 06-15(%/ann)=2.374

[Accident Costs (1994)]  
COBA Type=4  
Rate (per mil km)=0.822  
Cost (per acc)=54300  
LG AC Growth 94-96(%/ann)=2.347  
LG AC Growth 96-01(%/ann)=1.265  
LG AC Growth 01-06(%/ann)=1.468  
LG AC Growth 06-31(%/ann)=2.034  
HG AC Growth 94-96(%/ann)=2.347  
HG AC Growth 96-01(%/ann)=3.260  
HG AC Growth 01-06(%/ann)=2.666  
HG AC Growth 06-31(%/ann)=2.374



## PREMod PARAMETERS

### [P&R Bus Service Frequency]

SF AM(min)=10

SF PM(min)=20

### [P&R Bus Return Fare]

Fare(pence)=80

### [P&R Passenger Delay]

PD Peak(min)=15

PD Off-peak(min)=20

### [Bus Priority Speed Factors]

With Priority=1.3

No Priority=0.9

### [Hourly to Daily Trip Expansion Factors]

LV AM=1.5

LV OP=8.49

LV PM=2

HV AM=2

HV OP=8.57

HV PM=2

### [P&R Trip Purpose Split]

P&R Proportion Work AM(%)=90

P&R Proportion Work OP(%)=40

### [Parking Trip Purpose Split]

Parking Proportion Work AM(%)=80

Parking Proportion Work OP(%)=40

### [Work Based Parking]

WB PNRP AM(%)=60

WB PNRP OP(%)=30

WB Long Stay AM(%)=80

WB Long Stay OP(%)=30

WB Ave Work Short Stay Peak(Hrs)=3

WB Ave Work Short Stay Off-Peak(Hrs)=3

WB Ave Work Long Stay Peak(Hrs)=8

WB Ave Work Long Stay Off-Peak(Hrs)=6

### [Non-Work Based Parking]

NW PNRP AM(%)=20

NW PNRP OP(%)=20

NW Long Stay AM(%)=40

NW Long Stay OP(%)=50

NW Ave Work Short Stay Peak(Hrs)=2

NW Ave Work Short Stay Off-Peak(Hrs)=2

NW Ave Work Long Stay Peak(Hrs)=4

NW Ave Work Long Stay Off-Peak(Hrs)=4

### [Parking Charges]

Short Stay(p/hr)=40

Long Stay(p/hr)=65

All Day(p)=240

Parking Charge Escalator(%/ann)=1.4

### [New Measures Parking Hike Factors]

Peak Short Stay=1.05

Peak Long Stay=1.1

Peak All Day=1.1  
Off-Peak Short Stay=1.05  
Off-Peak Long Stay=1.1  
Off-Peak All Day=1.1

[New Measures User Charging - trips to town centre]

UC LV Peak(p)=10  
UC LV Off-Peak(p)=5  
UC HV Peak(p)=50  
UC HV Off-Peak(p)=25

[Discount Rate]

Annual Discount Rate(%/ann)=6

PREMod SITE FILE  
Site 8

[Scheme Costs]

Capital Cost(200 spaces)=1200000  
Capital Cost(400 spaces)=1800000  
Capital Cost(600 spaces)=2400000  
Capital Cost(800 spaces)=3000000  
Capital Cost(1200 spaces)=5000000  
Capital Cost(2000 spaces)=8000000  
Capital Cost(3000 spaces)=10000000  
Annual Maintenance Cost=60000

[Location Data]

Distance to Town Centre(km)=5.85

[Inter-Urban Trips]

JTW daily inbound(yr2000)=2578  
JTW daily outbound(yr2000)=2384  
Inbound Market Share(%)=5  
outbound Market Share(%)=5  
High Growth(%/ann)=1.2  
Low Growth(%/ann)=0.8

[Inter-Urban Fares]

Average return fare(pence)=260

[Inter-Urban Service Frequency]

Peak(Departures)=3  
Off-Peak(Departures)=7

[Inter-Urban Travel Distance]

Average One-Way Distance(km)=17

PREMod SATURN FILE

:Do Nothing

:Lv Hv ratio am,op,pm (derived from model matrices)

L,0.95,0.95,0.94

H,0.94,0.94,0.93

FName	AllTrips(veh/hr)	TCT(veh/hr)	TT(pcu-hrs/hr)	TD(pcu-km/hr)	AS(km/hr)	PI(Kgs/hr)
02L0900A	38986	5847	5513	250174	45.4	285
02L0905A	42144	6323	6801	274131	40.3	318
02L0910A	45224	6787	8714	298927	34.3	348
02L0915A	48694	7302	11452	327796	28.6	382
02L0900F	22094	2750	2668	153472	57.5	166
02L0905F	23883	2973	2895	165661	57.2	178
02L0910F	25629	3192	3131	177766	56.8	192
02L0915F	27595	3434	3420	191456	56	206
02L0900P	38986	1893	6087	258995	42.5	327
02L0905P	42144	2047	7694	282994	36.8	373
02L0910P	45224	2198	10062	307331	31.8	418
02L0915P	48694	2364	13953	337133	24.2	480
02H0900A	38986	5847	5513	250174	45.4	285
02H0905A	43743	6558	7804	289005	37	337
02H0910A	48226	7235	11252	327093	29.1	381
02H0915A	53294	7996	16937	370683	21.9	443
02H0900F	22094	2750	2668	153472	57.5	166
02H0905F	24789	3084	3052	174185	57.1	187
02H0910F	27330	3402	3411	192524	56.4	206
02H0915F	30202	3760	3866	213196	55.1	229
02H0900P	38987	1893	6087	258995	42.5	327
02H0905P	43743	2123	8899	296641	33.3	395
02H0910P	48226	2343	14105	335541	23.8	475
02H0915P	53295	2589	23634	377091	16	550

PREMod SATURN FILE

:Do Something, Site 8, With Bus Priority

:Lv Hv ratio am,op,pm (derived from model matrices)

L,0.95,0.95,0.94

H,0.94,0.94,0.93

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:FName,AllTrips(veh/hr),TCT(veh/hr),TT(pcu-hrs/hr),TD(pcu-km/hr),AS(km/hr),PL(Kgs/hr)
01L0800A,38922,5781,5886,253656,43.1,289
01L0805A,42074,6250,7468,278878,37.3,324
01L0810A,45103,6661,9677,303952,31.4,353
01L0815A,48531,7139,12778,332486,26.386
01L0800F,22052,2723,3658,158112,43.2,180
01L0805F,23839,2943,4104,170304,41.5,195
01L0810F,25553,3140,4551,182015,40.211
01L0815F,27492,3367,5272,195352,37.1,233
01L0800P,38938,1893,6061,258881,42.7,324
01L0805P,42092,2047,7631,282567,37.370
01L0810P,45133,2196,9707,306928,31.6,417
01L0815P,48571,2365,13779,335226,24.3,473
01H0800A,38922,5781,5886,253656,43.1,289
01H0805A,43670,6487,8797,294899,33.5,343
01H0810A,48098,7103,12695,332495,26.2,385
01H0815A,53116,7814,20222,374677,18.5,444
01H0800F,22052,2723,3658,158112,43.2,180
01H0805F,24743,3055,4345,176648,40.7,204
01H0810F,27249,3349,5171,193848,37.5,230
01H0815F,30089,3685,6471,213718,33.265
01H0800P,38938,1893,6061,258881,42.7,324
01H0805P,43688,2124,8762,296850,33.9,397
01H0810P,48129,2342,13511,333391,24.7,467
01H0815P,53160,2588,21783,375799,17.3,543
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